A Database Publication

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INCORPORATING electron user

Volume 8 Number 6 August 1990 £1.50

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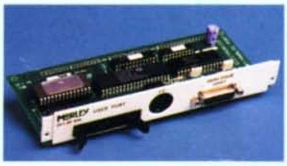

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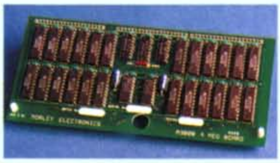

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Production Editor **Peter Glover**
Technical Editor **Mike Cook**
Reviews Coordinator **Pam Turnbull**
Advertisement Manager **Gail Blincow**
Advertising Sales **Peter Babbage**

Tel: 0625 878888 (All depts.)
051-357 2961 (Subs.)
MicroLink: MAG001
Telex: 94081191
Prestel Mailbox: 614568383
Fax: 0625 879966

Published by:
Database Publications Ltd,
Europa House, Adlington Park,
Macclesfield SK10 4NP.

ABC 30,212
July-December 1989
ISSN 0285-4040

The Micro User welcomes new program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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News trade distribution:
Comag Magazine Marketing
Tavistock Road, West Drayton.
Middlesex UB7 7QE.
Tel: 0895 444 055.

Database Publications is a division of Europress Ltd

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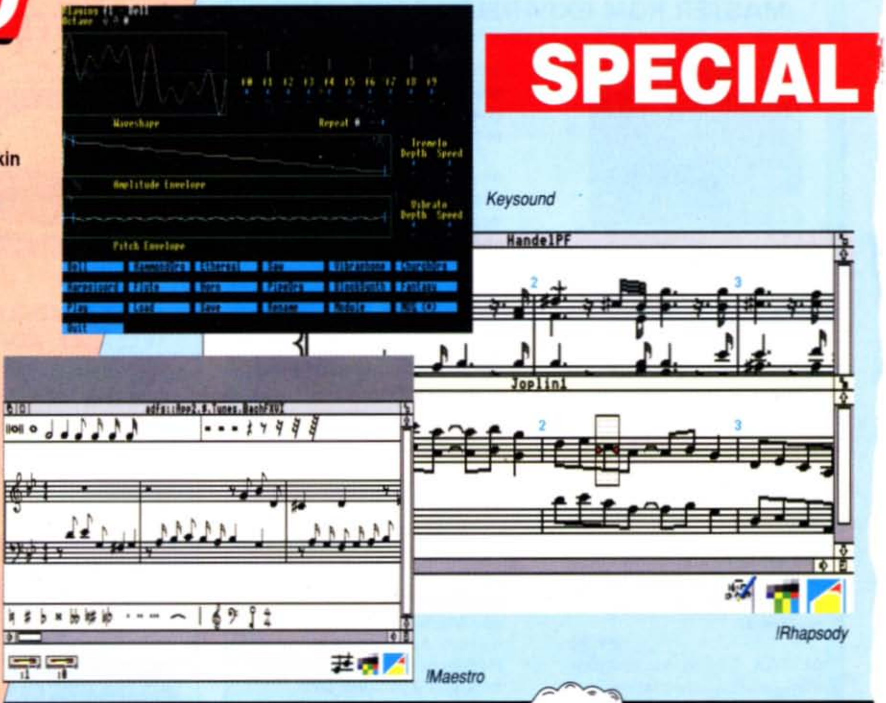

Keysound

!Maestro

!Rhapsody

Type-it-in

This symbol indicates that the feature contains at least one full length listing for you to key in on your micro. *

All the major listings in this magazine are accompanied by checksums to help you key them in correctly. For full details of how to use them see the article on page 72 of the February issue. **Get it right ✓**

MICRO USER CLASSIFIEDS

The best bargains in the world of all Acorn micros come from fellow readers of The Micro User. Turn to Page 78 to find just what you're looking for – from cheap modems to complete computer systems.

LET'S COMPUTE!

Find out about the new utterly brilliant fun magazine for ALL Acorn machines – turn to Page 14

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Welcome back electron user

AFTER seven successful years out on its own *Electron User* is back within *The Micro User.*

From this month all reviews and articles for the Electron will be covered along with those for the entire Acorn range of home micros.

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For the price of just one year's subscription just look at what you get: Twelve issues of the best magazine for the BBC Micro, Master series, Electron, Archimedes and BBC A3000, plus the monthly disc or tape containing all the listings, plus regular extras and public domain software – ***See Page 83***

THE MICRO USER
THE MICRO USER

What you'll find on this month's disc or tape:

- All the listings from this issue.

And exclusively for those readers with an Archimedes or BBC A300:

- Full !Wordchain listing.
- !Rhapsody music demo.
- Plus PD applications.

Take out a subscription NOW by filling in the form on Page 100

THE MICRO USER

Education

In our special Education issue NEXT MONTH we cover word processors and IT policies in schools plus lots of useful learning aids for both your 8 and 32 bit Acorn micros. Not forgetting our regular features, plus the money-saving PD Section.

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ovation

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Ovation: Introduction

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Ovation has many advanced frame features, such as linked text frames with auto-flow, repel text, definable frame borders and a step-and-repeat facility. Unique on the Archimedes, is our parent/child system for frames and lines. This system allows you to copy and paste frames with embedded child frames and lines, as single items. This allows diagrams, forms, tables etc. to be copied or moved with ease.

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News BEAT

Acorn's building a show village

ACORN Computers is to have a major presence at the next Computer Shopper Show to be held at Wembley Conference Centre from December 6 to 9.

It is planned to incorporate a whole Acorn village into the show to give visitors a pre-Christmas view of the latest in the Acorn range.

"We are now convinced that Computer Shopper Show, which had such an overwhelming success when it was launched last November, represents the most appropriate event for the leisure and small business market in the important pre-Christmas selling period", said Acorn's marketing manager for home markets Simon Lovesey.

"Acorn is encouraging its supporting software and hardware developers, dealers and peripheral suppliers to join them at the show so that both they and the visitors to the show can benefit from the impressive promotion we are planning for all the Acorn products".

The inaugural Computer Shopper Show last year attracted 26,650 visitors throughout the three days. This year it moves to the new and larger venue at Wembley and has been extended to four days. It is expected to attract 40,000 visitors and 280 exhibitors.

To avoid long queues, visitors are invited to pre-book their tickets by ringing 051-357 1736.

Admission is £5 for adults and £3.50 for children under 16 with £1 off for advance tickets. A pre-paid family ticket which includes two adults and two children costs £12.

The show will be open from 10am to 6pm Thursday and Friday, 9am to 6pm on Saturday and 10am to 5pm on Sunday.

The Computer Shopper Show is being organised by Blenheim Database Exhibitions.

Cartoons come to computers

A NEW comic-style computer monthly aimed at beginners has been launched by Database Publications, publishers of *The Micro User*.

Let's Compute! scores a world first by teaching computing techniques through the medium of colourful strip cartoons and easy-to-understand, fully illustrated articles.

Designed primarily for children, it is also expected to attract many teenage and young adult readers looking for a hand-holding introduction to computers.

"Above all, it puts the emphasis on fun", said Derek Meakin, chairman of Database Publications. "It's fun to read, fun to experiment with page after page of hints and tips, and fun to take part in the competitions with prizes galore".

Covering the full range of Acorn machines, *Let's Compute!* costs 99p. A preview copy is included with this issue of *The Micro User* – the on-sale date for the first *Let's Compute!* is July 16.

Easy way with words

MINERVA (0392 437756) has entered the word processor market with EasiWord, a package designed to combine easy input with professional output.

Specially written for Archimedes machines and the BBC A3000, EasiWord allows letters, documents and reports to be easily produced in widths from 30 to 132 characters. They can then be shown in any size including large characters for children and extra large for those with poor sight.

A true Risc OS package, EasiWord will allow you to insert, copy, move or delete blocks of text by highlighting the area and to search and replace both globally or selectively. Text can be centred, justified, indented or merged.

By entering embedded commands or by simple menu selection, all these features can be combined with different typestyles.

Text, background and highlights can be in any colour from the palette, making it fun for children.

Documents can be previewed on screen, then printed out simply by dragging the save icon to the relevant printer driver.

Easiword costs £39.95.

BBC Micros aid quake victims

AS the young people of Leninakan piece together their lives after the earthquake which devasted Soviet Armenia 18 months ago, 24 BBC Micros will be helping them with their computer studies.

Acorn Computers has stepped in to help the Department of Education and Science equip the city's new Lord Byron School, built with £5 million of British aid and named after the poet who wrote of the country's beauty.

The school was opened by the Prime Minister during her recent visit to Leninaken, the country's second city which was virtually destroyed by the massive earthquake.

As its contribution to the British Government's disaster aid, Acorn provided the DES with 24 complete BBC A3000 systems plus other equipment at 50 per cent of the normal cost. The package includes manuals, 1Mb upgrades, software, emulators, disc drives, and Midi expansions. The gratitude of the Armenian people was displayed during Mrs Thatcher's visit which produced the first case of "Maggie Mania" when thousands of residents clashed with the KGB to get a glimpse of her.

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Hints and tips on programming
Technical queries and expert answers

The programs published in each magazine, plus additional bonus items are also available on disc.

And here are some of the articles and series you missed in the last few months:

Mastering the Wimp – series on Wimp programming
Beginning 'C' – series on the C language
Assembler Workshop – all about ARM Assembler
Under the Lid – hardware series
CD ROM for the Archimedes
Watchdog Anti-virus
Using Draw Files in Basic
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These are some of the items published in the last few issues:

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French nickers nicked

SUSPENDED jail sentences and substantial damages have been handed out by the French courts following the piracy blow struck last year by UK firm GST Software Products.

Suspecting its French distributor Wings Micro Electronics of selling counterfeit copies of two of its packages, GST called in the police. This resulted in the largest software raid ever carried out in France.

The two directors of Wings have now been tried in the Paris courts and both have been given suspended jail sentences. Damages have also been awarded to GST, the authors and exclusive European publishers of the products and to US companies Digital Research of Monterey and Timeworks Inc of Chicago, both of whom suffered infringement of their trademarks. Lawyers acting for Wings have announced appeals against the decision.

GST is now using Guillemot International as the French distributor of its products, which include Typografica and 1st Word Plus.

More Unix workstations

ACORN has launched a new range of Unix workstations based on the company's second generation Risc technology – Arm 3.

Unveiled at the Unix User Show in London, the new range targets the healthcare market and specialist technical markets such as image processing and computer-based training, as well as universities and polytechnics.

"The new products strengthen the position of the R140 within a growing family of compatible cost effective Unix solutions", said Mark O'Riordan, Acorn's sales and marketing director.

"In the fast moving Unix market we are committed to providing customers with upgradeable platforms compatible with emerging industry standards".

The R260 features 8Mb of memory upgradable to 16Mb and includes a fast access 100Mb internal hard disc. The R225 lacks the hard drive and starts with 4Mb of ram which can be increased to 8Mb. Both units can communicate using industry-standard Ethernet.

The R225 costs £3,000, while the R260 starts at £5,000.

Risc man's top post

A MAN whose computer development career at Acorn started with the BBC Micro and ended in the design of the award winning Arm Risc chip set has been appointed to the prestigious post of Professor of Computer Engineering at Manchester University.

It was here that the world's first practical computer was built in the late 1940s.

Steve Furber, 37, is one of Acorn's longest serving employees and is a leading member of its advanced research and development team. He joined Acorn after being awarded a PhD in aerodynamics at Cambridge. He has been involved in the company's leading edge development ever since.

"This highly valued university post was strongly contested and it is a tribute to Steve and indeed Acorn that it should have been awarded to him", said Acorn's managing director Sam Wauchope.

"Manchester has a very good record for its research in computer science and is generally considered to be one of the leading UK universities in this field".

Wauchope has announced that Acorn hopes to set up collaborative arrangements between the company and the university group which Steve will be directing.

Ears outside the walls

IN the minds of most computer users electronic eavesdropping is consigned to the pages of spy novels, but according to a Camberley-based company this form of intrusion is now a real threat to computer security.

As MP Michael Colvin's Computer Misuse Bill is expected to become anti-hacking law in the autumn, it is claimed that eavesdroppers are moving outdoors and increasingly directing their receivers at computer companies' buildings.

The subject has been given the codename Tempest in military circles and moves have already been made to combat it by placing a Tempest standard into NATO regulations governing electronic equipment.

Commslogic (0276 691222) says that similar precautions should be taken in the computer world.

"The security threat posed by computer hackers and conventional eavesdroppers is well known, but few companies are aware of the existence of this particular form of electronic eavesdropping which should keep those involved in industrial and private surveillance ahead of the pack for years to come", said Dave Perras of Commslogic.

It revolves around the electromagnetic transmissions from computers, VDUs, modems and telephone systems which can be detected by simple radio receiving equipment up to 100 metres or even in certain circumstances, 1km away.

Commslogic offers independent specialist advice on all aspects of data security with particular emphasis on passive electronic eavesdropping.

"This is an area of data security that is set to expand over the next few years", added Perras. "It appears that companies are unaware of the risk. Considerable sums of money have been spent by responsible companies on security measures so that they comply with the Data Protection Act but this is a medium for access which bypasses all other security measures".

Upward curve

ACORN'S educational package The Learning Curve is beginning to attract inquiries from general business users.

Marketing manager for home markets, Simon Lovesey says there have been 8,000 inquiries generated by television commercials and national newspaper advertising. Of these, 30 per cent were interested predominantly for general business and personal use.

BEEBUG The Archimedes Specialist BEEBUG

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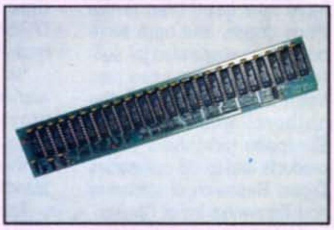
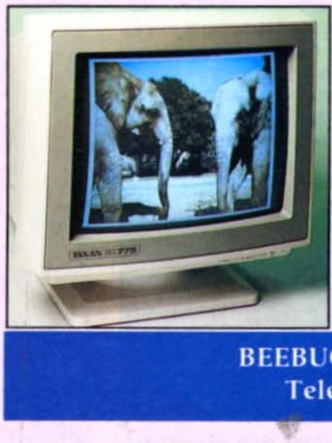
THE A3000 LEARNING CURVE



Acorn's new Learning Curve Package consists of an A3000 computer, First Word Plus V2 (the number one Word Processor package for the Arch), the PC Emulator, Genesis (A graphic based database system with a number of sample files). A parent's guide to the national curriculum and a demonstration video (VHS) is also included.

If you purchase an A3000 or Learning Curve from Beebug in addition to the backup service for which we are renowned, we will supply a free Beebug 1Mb RAM board. This board uses surface mount technology to achieve its remarkably small size of 256x46mm. A special feature of the Beebug upgrade is that it is expandable by the user to 3Mb (giving a total of 4Mb), unlike most other products. We believe that this is the best RAM board available for the A3000.

Learning Curve (no monitor)	699.00 (803.85 inc. vat)
Learning Curve (Acorn Monitor)	878.73 (1033.80 inc. vat)
A3000 (no monitor)	585.83 (688.85 inc. vat)
A3000 (Acorn Colour Monitor)	780.98 (918.80 inc. vat)



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Please add £230 (inc. vat) for an Acorn colour monitor or £459.95 for a Taxan 775+ Colour Multi-Sync if required..

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It's a music processor

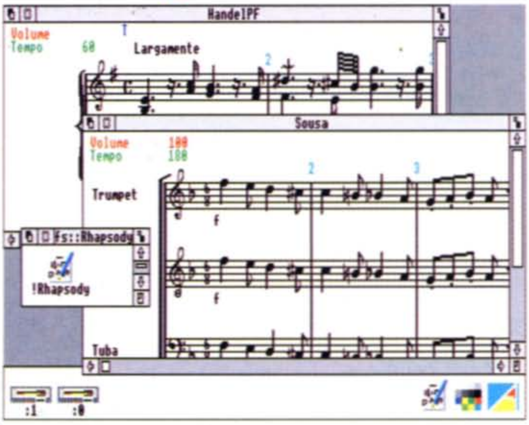
AN innovative new Archimedes package packed with useful editing features promises to bring the convenience of a word processor to the task of music composition and score writing.

Rhapsody has been developed by a physics teacher from Wolverhampton Grammar School and should be available in September from Clare's Micro Supplies (0606 48511) for £49.95.

More than just a sequencer package, Rhapsody puts many editing functions at the user's disposal. It will copy sections of music, transpose them, move them up and down and, most importantly of all, it will print them out on either a dot matrix or laser printer.

Of particular interest to musicians will be its compatibility with Midi. Users can connect up a Midi keyboard, play in music then transcribe what they have played directly on to the staves.

A keen cellist, the developer Mr. J. Linton is aiming his new product at four distinct market sectors. Because they will be able to print out their music and also hear it played back, GCSE pupils will be able to make use of the package to improve their composition skills. It will also be useful for teachers who want produce sets of parts.



Musicians will be able to type in the necessary accompaniment then use Rhapsody for practice and home users who are interested in music and computers will be able to combine their two hobbies.

"Rhapsody is not intended for the professional market, although there are plans to produce a professional version", said Mr. Linton.

"It is just a simple and easy to use program with features designed to produce acceptable performances and acceptable music to quite a professional standard.

"It has many features which are not in Maestro but it will load Maestro, files and change them into Rhapsody files".

Written in Basic but compiled with Silicon Vision's Risc Basic, it is fully Risc OS compatible.

More art on Archimedes

FLARE is a new art package for Archimedes machines which combines ease of use with a wide variety of features.

This latest offering from Silica Software Systems (0227 70279) installs itself on the icon bar. Clicking on this icon enters the package from where all drawing features are available. These vary from shape routines, advanced user defined brushes, area manipulation such as copying, scaling, lightening and darkening to a shadow brush, an undo facility and the ability to mix colours, producing a range in excess of 32,000 shades.

All functions are available at a mouse click and there are no complex menu structures to be memorised or difficult key combinations.

Many of Flare's features were added after trials with an education authority in the South West. For individual users, the single copy price is £19.99. There is an educational discount of 25 per cent and a single site licence costs £45.

Silica has also released Desktop C, a front end for Acorn's version 3 ANSI C compiler. This multi-tasks from the desktop allowing users to set all the compiler options from a series of Wimp windows.

Supplied with it are a number of other utilities including a special sticky desktop program which copies files dragged on to it into an area of ram. It makes the use of C version 3 much easier on a single disc drive machines. Price, £14.99.

Passing round the teletext

TServ-Risc is a teletext server for Econet which runs as a multi-tasking application within the desktop environment of an Archimedes or BBC A3000. It allows teletext pages to be sent to BBC Micros and Archimedes machines elsewhere on a network and comes from XOB (030 784 364).

The server accepts requests from terminal software running on any Econet station, downloads the appropriate teletext pages from a Morley teletext adaptor connected to the host computer then transmits them to the requesting station.

Requests from many stations can be accepted simultaneously and these are dealt with quickly by means of an intelligent cueing system.

TServ-Risc is a full Risc-ware application so the computer running it can also be used for other well behaved applications at the same time. In particular, a given machine may be used both as a teletext server and with suitable additional software as a printer server and still have processing time to spare for additional tasks.

The software without a Morley teletext adaptor costs £87. Software and adaptor cost £205.

Ballistix joins Sam

BILLED as the fastest, wackiest, toughest computer ball game yet, Ballistix will be the star offering on Play It Again Sam 14, the next in the successful series of BBC Micro compilations from Superior Software (0652 58585).

Ballistix features an amazing 60 different action screens. Likely to be teamed with it will be Predator, the computer game of the Schwarzenegger film which challenges players to take a crack commando unit into the South African jungle to rescue a bunch of trapped diplomats.

Other titles for Sam 14 are still uncertain, but Superior boss Steve Hanson is considering new game Star Port from the author of Quest, Tony Oakden. It's a space version of Tony's previous arcade adventure, Camelot.

Another likely contender is Network from Peter Scott. It's a similar but bigger version of Peter's previous game, Pandemonium, which was a hit on Sam 13.

Prolific games guru Peter Scott

The Sam compilations cost £9.95 for BBC Micro cassette, £11.95 for BBC Micro disc and £14.95 for Master Compact.

Archimedes is cancer aid

AN Archimedes is helping in the early diagnosis of an unusual form of cancer. At the Institute of Laryngology and Orology in London, the Acorn computer is teamed with Digit software to measure minute cell enlargements which are the early signs of verrucous carcinoma.

This innovative computer dianostic aid is the brainchild of Professor Leslie Michaels, a pathologist specialising in ear, nose and throat research.

"With this particular form of cancer, the cells look as though they are a benign condition", Professor Michaels told *The Micro User*. "We have now found that the cells enlarge with verrucous carcinoma.

"The Archimedes is very well set up to make the type of measurements we need to diagnose this".

Previously, Professor Michaels and his staff had to use an unwieldy process of photography and measurement of suspect cells in specimens sent for biopsy. Now they put the histological sections under a microscope and TV camera and feed the information directly into the Archimedes, which does the rest.

"Only today one of the pathologists on the project referred me to a case which on initial inspection he thought was benign – just a wart", added Professor Michaels. "I thought it had the hallmarks of this form of cancer and decided that we would run it through the Archimedes system. It turned out to be cancer".

Russian art goes on disc

HIDDEN Russian art treasures are to go on view for the first time thanks to British technology.

Anglia Television and Interactive Learning Productions of Newcastle University have collaborated to produce an interactive video disc record of pictures and sculptures from The Russian State Museum in Leningrad – many of which have never before been seen in the West.

Specialised software developed by Interactive Learning Productions is being teamed with Anglia's innovative Key Plus database technology to compile this photographic record of hundreds of Russian masterpieces.

Produced for use with Archimedes computers, the first demonstration discs will feature 1200 works of art, including 200 by the artist Malevich and will be ready by September.

Anglia's education officer Peter Stibbons said: "The Russian State Museum is able to exhibit only about one per cent of its vast collection and has not had a complete photographic record of the rest. We anticipate great interest from the fine art market, galleries and museums in the West.

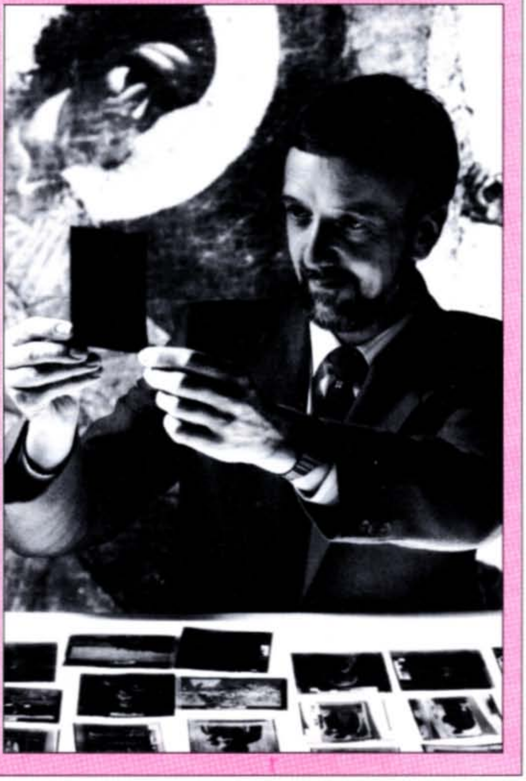
"The interactive potential of the system also has exciting implications for educational institutions and we would hope to develop television and video uses as well".

Initial moves on this exciting project were made when Dean of the Institute of Mathematics Modelling in the city of Leningrad, Kirill Rozhdestvensky, visited this country on an interactive video fact finding mission. One of his ports of call was Interactive Learning Productions.

"When we first started this project we were given the choice of absolutely any machine we wanted", said Fred Grainger of ILP. "Because of its power, versatility and graphics capabilities we chose the Archimedes.

We tried doing our work with other systems but because interactive video needs speed of access and very quick graphics, we decided the only one was Archimedes".

Marketing arrangements for the Russian art discs have not yet been finalised.



Top moves at Mastertronic

AS an increasing number of smaller software houses go to the wall, business is polarising to the big names in the game.

Typical is Virgin Mastertronic, well known to the Acorn market for its Melbourne House and Magnetic Scrolls titles. It has restructured its operation because of the growth in its business. "It now looks as though our turnover in the financial year starting August will exceed £100 million", said managing director Nick Alexander. "This compares with a figure of around £12 million only two years ago.

"Growing at this rate puts our management under significant pressure while being, none the less, highly stimulating, but it means that periodically we need to strengthen our senior and middle management".

Philip Ley has become general marketing manager, Lesley Walker is now marketing manager, Sue Smith is credit and sales administration manager, Nigel Webb has been promoted to artwork and design manager and Catherine Spratt is now marketing coordinator.

"We will also shortly be announcing the appointment of an international director from outside the industry", added Alexander. "We believe these moves will greatly strengthen our marketing and sales management and we are especially pleased that all these positions have been taken by internal candidates, which is further evidence of what a strong group we have in the company".

American Keypunch KOs Tynesoft

A BAD debt of £130,000 owed by American company Keypunch, plus continued delays in its latest Elvira product have been blamed for the failure of well-known independent software house Tynesoft.

Time and cash ran out for the North East company and receivers have been called in. To add insult to injury, a fire in one of the firm's buildings has since damaged stock which was due to be sold off.

"I cannot raise anyone's hopes. There is absolutely no chance of money being available for unsecured creditors," said Ed Janes of accountants Price Waterhouse which has been appointed official receiver.

"The failure of Tynesoft was due to the combination of two principal problems. In the latter part of 1989 they entered into an agreement with American company Keypunch to produce versions of 10 games for them. For this they were owed £130,000 and they have not been paid one penny.

"The directors believe Keypunch is subject to some form of administrative hold-up in the USA. While at some stage in the future they may receive some of the debt, that cannot be relied upon in the short term.

"This coincided with delays in the launch of their latest Elvira product, which slipped and slipped. It is now almost complete, but it came too late.

"A few days after I was appointed, a very small fire occured at the premises and some of the stock was damaged by smoke". No one from Tynesoft was available for comment, but trade sources claim that its affiliate label Horrorsoft will still produce the highly successful Elvira products.

One of Tynesoft's latest hit titles for the BBC Micro was Circus Games.

Making an impression

TWO new versions of the foremost Archimedes DTP package Impression have been announced by Computer Concepts (0442 63933). Impression Junior is a simplified version of the current program and Impression Release 2 is an enhanced upgrade.

Many existing and potential users of Impression feel that it does too much, and this has led to the development of Impression Junior. It is aimed at users wanting enhanced word processing with the ability to create the occasional DTP document.

While certain areas such as styles and master pages have been simplified, Impression Junior looks and behaves like the original package and includes most of its features. New features have been added to extend the character mode word processing facilities.

It is a frame-based program which can use the outline font system plus Risc OS printer drivers, embed graphics at any position and link to other Risc OS applications. Still under 300k long, it can easily fit into 1Mb machines even with a spell checker loaded.

Impression Release 2 is the first major upgrade to the original package. It offers multiple frame selection, grouped frame operation, inside frame repel margins, loadable frame borders and enhanced print options.

For effects, a completely new main menu option allows any portion of text to be altered without having to define style. It is completely compatible with Release 1 and with Impression Junior and includes the new features of the latter.

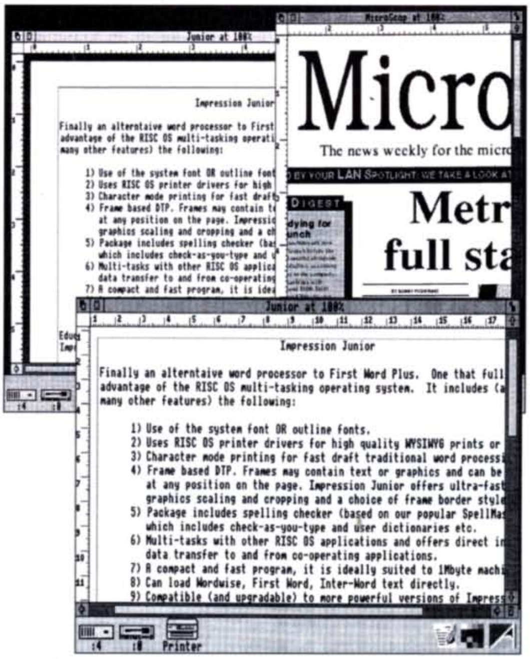
Among other facilities are a show text flow option, quick graphics panning by mouse drag, rulers round the edge of the page and better template handling.

Said Charles Moir boss of Computer Concepts. "Impression has become the standard DTP program for the Archimedes and we are now stretching the range so that the Impression family covers all aspects of word processing.

"Impression Junior is, at last, a very real alternative for First Word Plus, while Impression Release 2 extends the gap between other DTP programs, some not even released, and Impression".

Release 2 will cost £169, with a free upgrade for existing users.

Impression Junior will cost £89.95. As *The Micro User* went to press, both were estimated to be six weeks away from release.

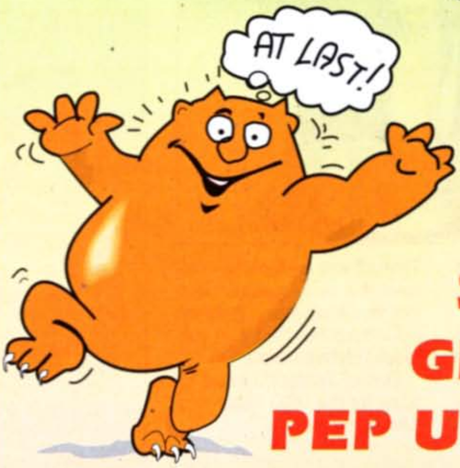


Impression Junior

Finally an alterntaive word processor to First Word Plus. One that full
advantage of the RISC OS multi-tasking operating system. It includes (a
many other features) the following:

1) Use of the system font OR outline fonts.
2) Uses RISC OS printer drivers for high quality WYSIWYG prints or
3) Character mode printing for fast draft traditional word processi
4) Frame based DTP. Frames may contain text or graphics and can be
at any position on the page. Impression Junior offers ultra-fast
graphics scaling and cropping and a choice of frame border style
5) Package includes spelling checker (based on our popular SpellMas
which includes check-as-you-type and user dictionaries etc.
6) Multi-tasks with other RISC OS applications and offers direct in
data transfer to and from co-operating applications.
7) A compact and fast program, it is ideally suited to 1Mbyte machi
8) Can load Wordwise, First Word, Inter-Word text directly.
9) Compatible (and upgradable) to more powerful versions of Impress

Announcing something completely different Acorn computer



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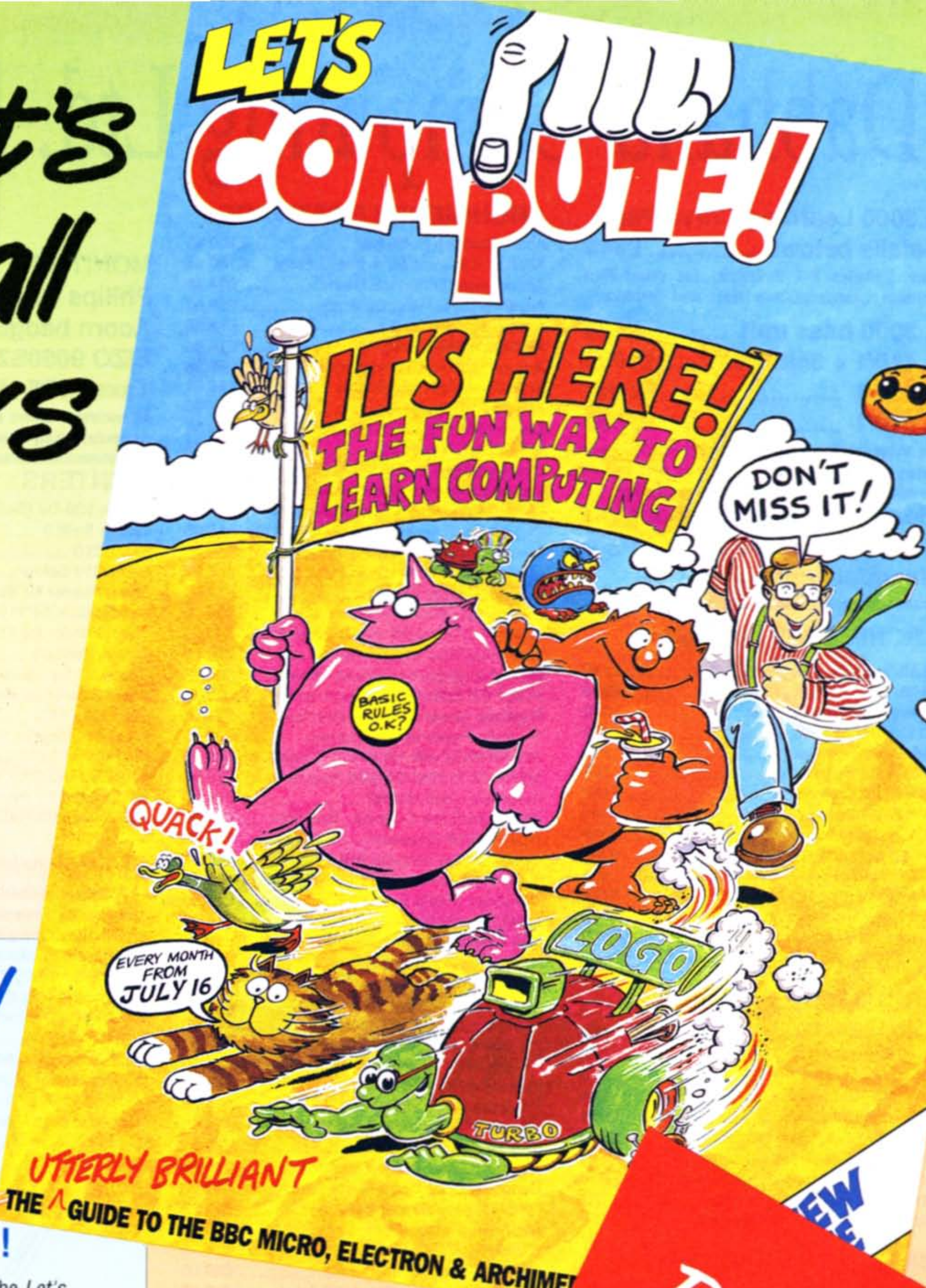
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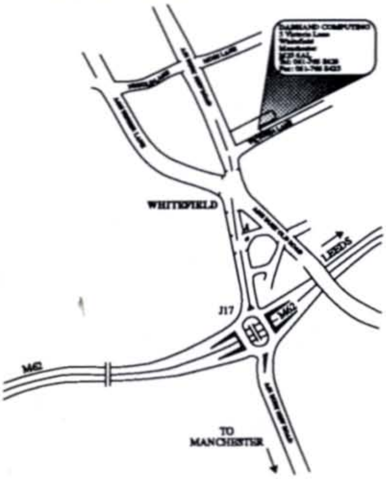

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UPDATE

Giving mathematics child appeal

SEEKING a new approach to maths and the National Curriculum, Bill Bonham of Sherston Software (0666 840433) has come up with Connections, a package designed to make maths appealing to young children and to sustain their interest.

Written by Simon Hosler, Connections supports the maths demands of the National Curriculum to levels 1 and 2. It challenges children to alter the contents of various windows so that their connections are correct in line with various maths activities. These include addition, subtraction, money, halves, quarters, odds and evens, graphs and shapes.

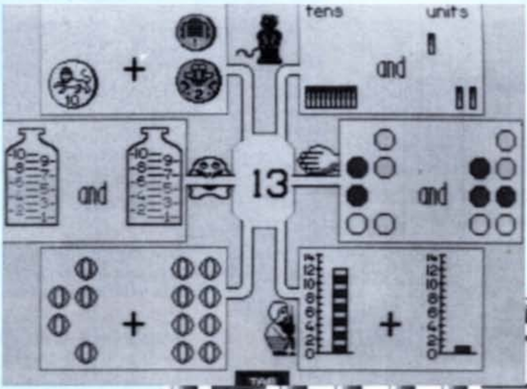
Through a control menu, the teacher can select a wide choice of attainment targets at levels 1 and 2. Activities can be shown on screen or printed out as worksheets.

The package comes with start-up disc, copyable work disc, Concept Keyboard overlays, children's introductory and key cards, a quick guide and a teacher's manual. Until July 31, it costs £25.87. After that date, £28.75.

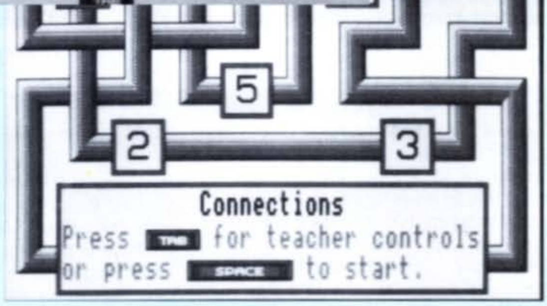
Also new from Sherston is Animated Numbers, a follow up to the company's successful Animated Alphabet. It brings numbers to life in three interconnected activities.

In Ladders, the children have to help Numberbod find the right number to match a set in a ladder maze. In the Pictures section, children have to type the right number to start an animated number story and Links provides practice for simple set work.

Designed to help children get to grips with simple number concepts, Animated Numbers is relevant to level 1 of maths ATs 2,3 and 4. Fully compatible with the Concept Keyboard, it comes with both A3 and A4 full colour illustrated overlays and a teacher manual. Introductory price until July 31 is £17.25. After that date, £20.12.



Animated Numbers make arithmetic come alive



Connections

Press TAB for teacher controls

or press SPACE to start.

Finding connections to aid learning maths

Polytechnic lab uses Risc technology

STUDENTS in one of the largest computer science departments in the UK are being given their first taste of Acorn's Risc technology.

Local MP Bill Cash has opened a new computer laboratory at Staffordshire Polytechnic which has 8,000 students and a computer science department boasting more than 1,000 students and 80 staff.

Computers for the new facility have been donated by Acorn Computers and Crewe-based Acorn dealer 3SL. Ten R140 workstations are networked together using standard Ethernet communications and give access to the department's mainframe computer. This allows students to work individually while also gaining valuable experience programming and operating networked systems.

"We are delighted with the new facility and we are very grateful to Acorn and 3SL for supporting the Polytechnic", said Dr Roy Newton, head of the computing department. "The machines are powerful and flexible for use across a wide range of computing applications. In particular, we will be using the R140s to teach students about new high-speed Risc computing architecture".

Opening the new laboratory, Bill Cash MP said: "Staffordshire Polytechnic has a first class and nationally recognised reputation in the field of computing and if Britain is to remain competitive in the increasingly high tech world, we must encourage this type of co-operation between industry and education".

Capital idea for small fingers

YOUNG children are taught to read and write in lower case – a fact not catered for by computer keyboards. SFA Computers (041-840 1477) has now designed a lower case keyboard overlay for use by small children.

It allows children to access all keys as lower case avoiding the confusion of converting to capitals when starting to do computer work. The overlays are available for most makes of computer at prices starting from £12.63 with special discounts for bulk education orders.

Package keeps track of absentees

THE need to keep comprehensive pupil attendance and punctuality records often gives senior school staff the chore of repetitive reference to class registers. Now a computer program has been developed to do the job.

Mark Master from Chalksoft (0775 69518) has been developed over four years in a large comprehensive school. It allows staff to print out good or poor attendance lists, class and year lists and to produce attendance statistics.

Once the program is set up it's just a case of updating it each week from class

➤

➤
registers. Mark Master will show percentage attendances by the week, name pupils with less than 80 per cent attendance, point to those who are the worst offenders for lateness and will also highlight those with good records.

The A3000 version costs £69 and versions for the Master and BBC B each cost £59 on either 40 or 80 track discs.

Multimedia packs for universities

DIGITHURST (0763 242955) has launched MAP90, a multimedia awareness project designed to help universities and other educational establishments develop multimedia applications and databases.

Aiming MAP90 at the scientific and medical fields, Digithurst is giving away 50 multimedia packages which include the MicroEye 1A video processing unit and a copy of the multimedia authoring software package PictureBook for use with Risc-based Archimedes machines. Each pack is worth more than £500.

MicroEye 1A captures video images and enables them to be processed under Risc OS. PictureBook is a hypercard-type multimedia package which allows text and images to be linked by association. It interfaces to expert system software which can be used to prioritise data and enable PictureBook to find its own links between data items.

"We are looking for establishments which can come up with bright ideas for the use of multimedia", said a spokesman for Digithurst.

The scheme will run until the end of the year. Application forms for eligible organisations are available from Digithurst Ltd, Newark Close, Royston, Herts, SG8 5HL.

Multimedia set to takeoff

Kiwi programmers are making good

WHILE most software houses look close to home for their programmers, Mike Matson of 4-Mation (0271 45566) has gone to the other side of the world. All his education packages are now written by a team of bright youngsters in New Zealand – most of whom he has never met.

Last year Mike decided to concentrate on the Archimedes market. He had previously written 8 bit programs himself but soon realised that the demands of the 32 bit market were more than he could cope with. While on a lecture tour in New Zealand he met 16 year-old Arc programmer Karl Ansley of Christchurch. After returning to the UK, he sent Karl an idea built around jigsaws. "I heard nothing more for a couple of months and then through the post I received an excellent piece of programming", said Mike.

The program was Jigsaw which has already been added to 4-Mation's list of best sellers. Karl has since produce a junior version called Jiglet and another program called Snippet.

Through contacts in New Zealand, Mike has since taken on Dave Caughley of Wellington and Paul LeBeau of Christchurch. Both in their early twenties, they have produced Poster – the latest addition to the 4-Mation range and are now working on two new ideas.

"Last year I gave out some ideas to different people in this country, including local education authorities, and I got absolutely nothing", said Mike. "In comparison, the Kiwis have come up trumps every time".

Mike will meet up with his unknown programmers for the first time later this year when he returns to the Antipodes.

Micro art goes on show

FIVE educational programs specially produced by Topologika (0733 244682) are being featured in the largest art exhibition ever held for children. It is part of the cultural celebrations taking place in Glasgow.

At The McLellan Galleries until August 26, The Art Machine has been organised by Glasgow's museums and art galleries and is jointly sponsored by Acorn Computers, Central TV and Roland UK.

Acorn has donated 16 of its A3000 micros, 10 of which are fitted with concept keyboards. Young visitors to the exhibition are encouraged to take an active part rather than just looking. To promote this, Topologika has produced the five programs which have artistic themes combined with maths.

Pattern Tiles allows them to arrange patterns with four colour square tiles. Snowflake let them explore fractals, Cyclic Story is an environment program which challenges youngsters to create a cyclic story, Moving Squares lets them create their own motion pictures and Fractal Trees lets users design trees, then watch them grow.

The five A3000 packages with a 48 page book cost £19.95 if bought at the exhibition, but will go on general sale for £29.95.

Also new from Topologika is Astro, a desktop space exploration package with seven programs which allow children to seek out the wonders of our solar system. It costs £19.95 and is available for Archimedes machines and BBC Micros.

For the same formats, Untrivia is based around the trivia quiz idea. By using it, teachers can test their pupils' knowledge of maths and a future program will take in science subjects. The system disc costs £9.95 and quiz discs are £9.95 each.

Rounding off Topologika's latest releases is a new support disc for its best-selling maths adventure game Giant Killer. Price, £14.95.

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BATMAN PACK

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Mightier than the sword

Converting software to the Archimedes is quite a task. Marshal Anderson checks out the success of the new PenDown

FOR the past year those junior schools that have bought an A3000 have been waiting for a word processor to go with it. So far promised are Folio, a package from Clares, and PenDown from Longman Logotron. The latter finally arrived, as a review copy at least, and looks as though it will fit the bill for many schools.

The 32 bit PenDown is not a re-write of the BBC Micro version but a completely new system. It is fully multi-tasking and when double-clicked from the directory viewer it loads in and sits happily on the icon bar.

It appears to take very little space in the machine, so there will be room for a database to work alongside it.

You cannot edit more than one PenDown document on the screen at once in the way !Edit will, but you can load up more than one copy of PenDown if you really need to.

Clicking on the icon produces a blank page with a ruler and icons. However, the disc can be easily configured to come up with a blank sheet automatically, hiding any or all of the icons and menus, which immediately gives you a package that will grow with the child.

They could start with a large font and just the save option available, being introduced to the more complex options gradually as time goes by.

The caret looks as it does in all Archimedes software and can be moved around with the arrow keys or the mouse. Using a mouse to move around the text can seem awkward, but you and the children will soon get used to it, especially if other mouse-driven software has been used before. You need the mouse anyway for large movements, using drag bars at the side of the screen to move through the document.

Product: PenDown
Price: £39
Supplier: Longman Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 1BR.

Clicking on the ruler icons gives access to a variety of functions which use the mouse and windows in the standard Risc OS form.

Several fonts are provided: Jumbo is a standard blocky infant style, Lineout and Relief give nice effects and Trinity can be used for normal typing.

All are anti-aliased – that is smoothed – and can be sized from unreadably tiny up to almost one letter per page. There was no problem getting the package to use other fonts like the ones on the applications disc. Just insert the disc, click on the disc icon and also on the font.

> *The search and replace window is quite sophisticated and includes the ability to search for whole words only*

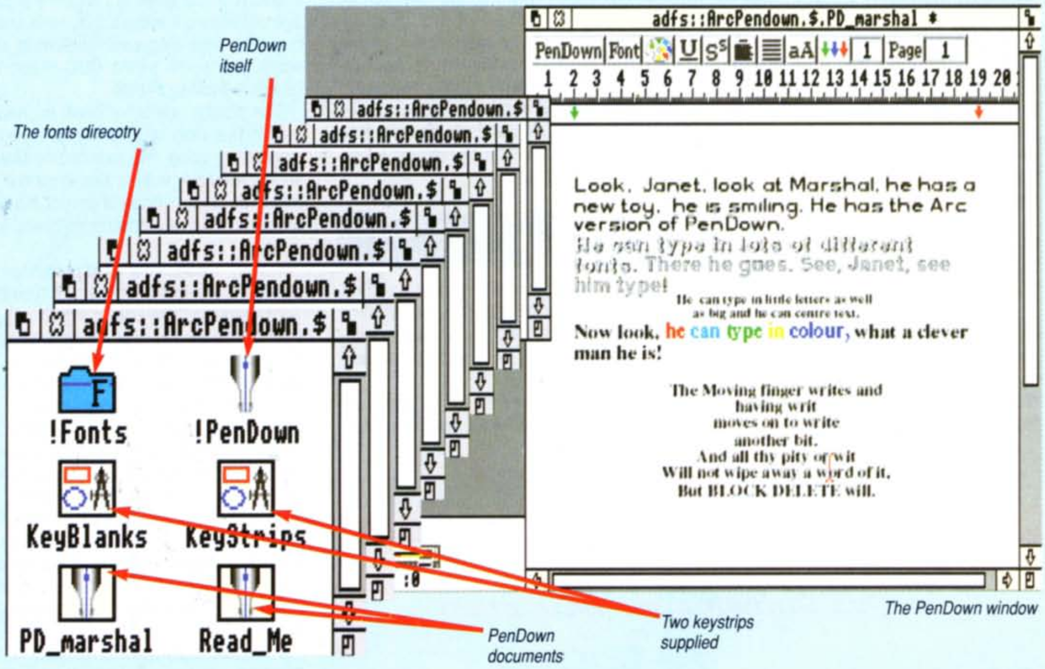
If you try this remember that the font file has to be on the disc containing your text – a little experimentation will get you there. As well as controlling the overall size of the font you can alter the height independently, which offers considerable variation.

The next icon accesses colour – 16 are available – for use with a colour printer. This is followed by underlining in three widths and at three heights plus sub and superscripts.

The formatting icon has the usual justification options and leading (pronouced *ledding*) gives control over the line spacing in 72nds of an inch, the standard print unit. There is also a case change option.

For all of the above you can act on the whole document, from the cursor line down or on marked text. Text is marked from the caret by holding down the right button and dragging the mouse to the end of the text you want. While it might seem like a lot of effort to mark and, say, separately colour all the letters in a single word, the mouse breezes through it.

The ruler can be set in centimetres, inches or picas (sixths of an inch) so you can tailor work to fit pages or displays with



Look. Janet. look at Marshal. he has a new toy. he is smiling. He has the Arc version of PenDown.

He can type in lots of different fonts. There he goes. See, Janet, see him type!

He can type in little letters as well as big and he can centre text.

Now look, he can type in colour, what a clever man he is!

The Moving finger writes and
having writ
moves on to write
another bit.
And all thy pity or wit
Will not wipe away a word of it,
But BLOCK DELETE will.

pre-set sizes. Additional rulers can be brought into the text to affect the caret line or a marked block. While the current ruler settings are shown at the top of the screen the ruler position is not shown in the text.

I can't help feeling, that this is an error, as rulers can have surprising effects and you can loose track of them as you go back to text after a day or so.

You can also have a vertical ruler on which top and bottom margins can be set.

Taking the pointer into the text area and clicking the centre button produces another menu, from which you can save work as PenDown files or plain text by dragging in the approved manner. You also print here, though you will need a standard printer driver.

The page option gives overwrite or insert modes and page sizing. This allows setting the page width and length in millimetres and gives a range of standard sizes as well as choosing alternatives. The scale of the display can also be altered.

Edit gives access to word and line deletion and block manipulation. Blocks may be moved, deleted or cleared and the PenDown bin has been carried over from the earlier version.

Blocks may be deleted or copied to the bin where the text is saved for later use. This is a neat idea and one which junior school children readily understand.

The search and replace window is quite sophisticated and includes the ability to search for whole words only. This really is good because it stops the package coming up with words within words and allows you to use the automatic option, where all occurrences are replaced without reference to the user, with confidence.

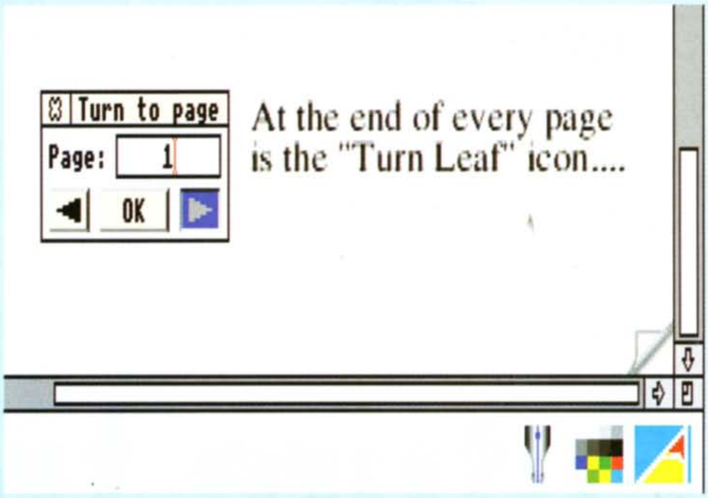
Many functions will operate from combination key presses or the function keys; the latter can also provide foreign characters.

Not every original PenDown function of has been carried over yet. Omitted from this version are the dictionary and planning functions which were so useful in earlier versions.

The manual is of the highest quality – even the pre-release version I was supplied with – and is full of helpful ideas on classroom use as well as clearly setting out the package's operation.

Summing up

PenDown works very well and can be thoroughly recommended to both junior and the lower end of secondary schools. It makes full use of the Arc environment but never gets too complicated because of the thoughtfully designed menus. The real test will come when it is held up, for price and facilities, against the other packages now under development.



At the end of every page is the "Turn Leaf" icon....

There are three ways of changing page

Future trends

A package that guesses what you're typing? Marshal Anderson shows it has its uses

PREDICTYPE 3, the latest version of Scetlander's typing aid, monitors your key presses and tries to guess which word you are trying to type. The program's guesses are displayed as a short menu on the screen and if you see the word you are after then pressing that number completes the word in the text.

Scetlander have designed the package to work with specific word processors – View, Wordwise (Plus), Interword and Writer.

It's worth noting that Writer has to be copied on to the Predictype disc to be used. The instructions in the manual refer to the older version; on later versions you may find that the file you need to copy is RIX not WRITER. Trying to load an overlay file with Predictype installed will cause problems.

It's uses are fairly plain: It will enable anyone who has trouble using the keyboard to move on with more speed, ranging from young children through older children and adults with learning difficulties to the disabled who can manipulate a keyboard but only slowly.

Viable tool

This final application is very exciting because it means that, at £35, the machine becomes a viable tool for many users without the addition of more expensive hardware.

There are options to set up the word processor to work with and then load Predictype into sideways ram – the package will not work without this. As is usually the case with programs resident in sideways ram, some of the BBC B rom/ram boards will cause trouble.

The program does not seem to check to see if the ram is already in use and insisted on using rom four on my Master, so you will have to bear this in mind if you are using a rom image of one of the word processors or any other rom-based software.

Having chosen your word processor you select a word list from the Predictype disc. Those provided are Basics, which will give you 128 frequently used words and Long, which contains nearly 1,500 words. The package introduces is no discernible delay on most of the word processors, but Interword seems to be slightly affected. This is really no problem as anyone needing this package will not be typing quickly enough to be worried by slight delays.

At first sight it seems natural to use the largest word list available but this is not the case. You should set the word list appropriate for the user, thus removing unwanted words from the menus and speeding the process.

Another option allows you to set Predictype to learn. This has two aspects, the first is the frequency with which a word is used seems to raise its position in the menu shown. The second is where Predictype remembers new words and includes them in subsequent predictions. Thus the package tailors itself to the individual user.

Predictype will learn incorrect as well as correct spellings so the option to turn learning off will be important if you are using the package with people who have spelling problems!

One way round this is to edit the word list. This can be done by loading it into a word processor where you can change not

Creative Software for Education
Predictype 3
Scetlander

Product: Predictype 3
Price: £35
Supplier: Scetlander Ltd., 74 Victoria Crescent Road, Glasgow G12 9JN
Tel: 041 357 1659

> *An exciting package with applications at many levels*

only the words but also alter the expected frequency. This means that you could set up a vocabulary to be used with specific project work. You can also have Predictype learn all the words in an existing text file.

These features will let you build up a library of files for use in different circumstances and make the package very useful indeed.

Scetlander says you can use Predictype with *most programs which need text to be typed in.* Unfortunately this did not turn out to be the case. You can enable Predictype with *PREDICT but pressing Break disables it.

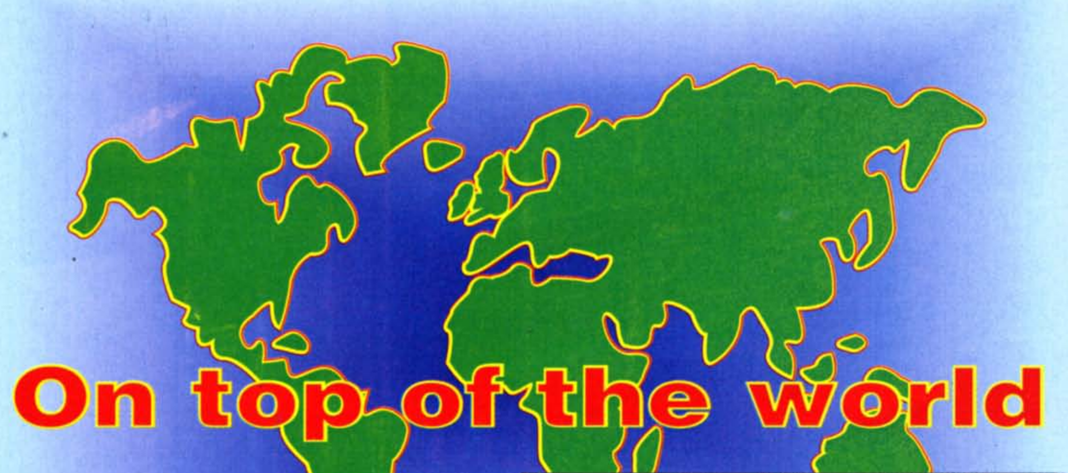
Getting around this with *EXEC !BOOT lets you try out various packages. The only adventure I found it worked well with was Giant Killer, while Worst Witch, L and Puff wouldn't cooperate.

It worked after a fashion with The Sorting Game and Branch, but the screen's of other packages like Our Facts and Logotron Logo were messed up.

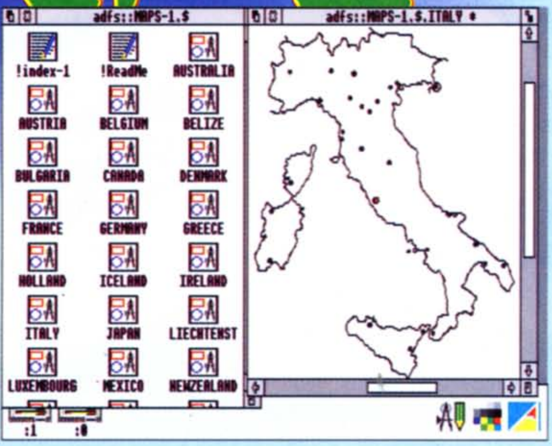
It did work with Quest, and has a very practical application here presenting the unmemorable key words. It is compatible with simple text processors like the file creators in Tray and Teletype, perhaps expanding their use.

Summing up

This is an exciting package with applications at many levels. If you use any of the word processors covered it has to be a worthwhile investment.



On top of the world



Product: World Geography Maps
Price: £29.99
Supplier: Micro Studio Ltd., 22 Churchgate Street, Soham, Ely, Cambridgeshire CB7 5DS
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WORLD Geography Maps from Micro Studio is the first really impressive set of !Draw files for the Archimedes or BBC A3000 in schools.

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The only real problem with it is the map's large size, but you can soon reduce them using !Draw's scale function and then add anything you wish. Another nice thing about using the scale facility is that you can give the impression of different projections.

With this package you will be able to produce excellent worksheets, illustrations for newspaper articles, OHPs and so on. No self respecting geography department should be without it.

Marshal Anderson

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The chain gang

Martin Hansen brings a 19th century word game to the most modern of micros

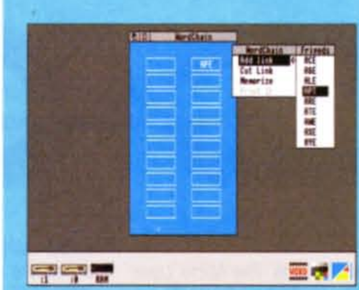
WORDCHAIN is a DeskTop application for the Archimedes which designs and prints versions of Lewis Carroll's famous Doublets word puzzles. The victim is given start and finish words and must change one into the other by the use of friendly link words.

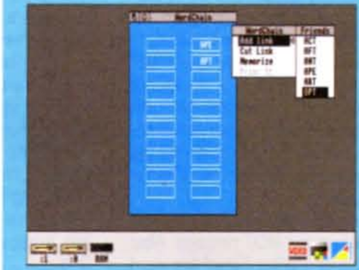
A friendly word is one that differs from another by only one letter. For example, words that are friendly with *port* include *Sort*, *pArt*, *poSt* and *porE*. To add to the elegance of the puzzle the word that starts the chain and the one that concludes it should have an association of some kind, such as LOVE to HATE. Here's a puzzle along with its solution created by !WordChain which turns APE into MAN:

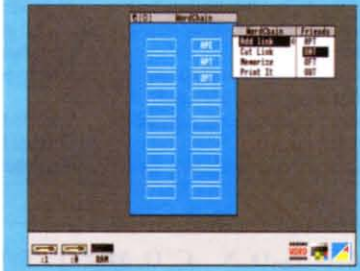
```
APE APT OPT OAT MAT MAN
```

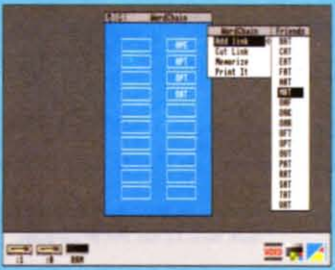
The program is on this month's disc that

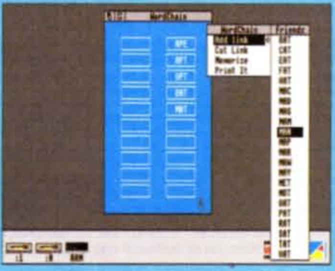
➤

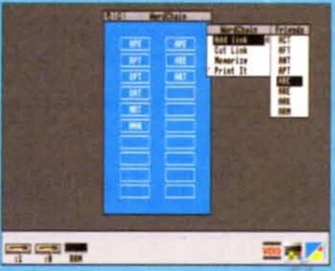


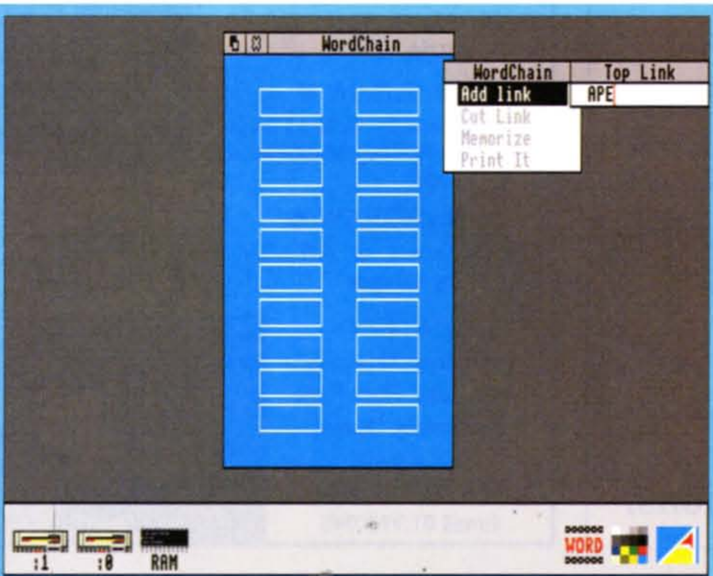




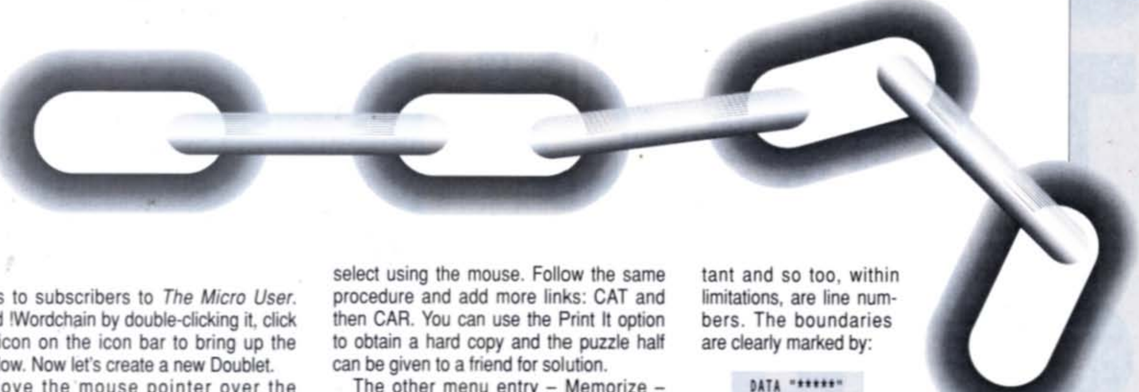








Building a doublet using !WordChain



➤ goes to subscribers to *The Micro User*. Load !Wordchain by double-clicking it, click the icon on the icon bar to bring up the window. Now let's create a new Doublet.

Move the mouse pointer over the !WordChain window and click on Menu. The main menu will appear on the right hand side of the window. This non-standard arrangement was used to prevent the menu from popping up on top of what you're looking at.

Move to the Add Link submenu and type in a three letter word – MOT perhaps. After pressing Return or clicking Select this word will appear at the top of the first vertical box. Click Menu again and move to the Add Link submenu.

The power of the program is now clear because all the words that MOT can be transformed into according to the rules will be listed.

The top entry is COT, which you may select using the mouse. Follow the same procedure and add more links: CAT and then CAR. You can use the Print It option to obtain a hard copy and the puzzle half can be given to a friend for solution.

The other menu entry – Memorize – simply transfers your current idea to the left hand column. This is simply a store in which promising ideas can be parked. Selecting Memorise a second time retrieves the design.

Clicking Menu on the icon on the icon-bar calls up a second menu which contains Info, a restart option called New Chain and Quit.

The !WordChain database contains words of three, four and five letters in length. More can be added quite easily and will keep you out of mischief for quite some time.

The words need to be placed in DATA statements and separated by commas. The number of words to a line is unimportant and so too, within limitations, are line numbers. The boundaries are clearly marked by:

```
DATA "*****"
```

There are REMinders at the end of the !RunImage program.

● *Writing a DeskTop application is a most satisfying achievement. It demonstrates that the latest Acorn micro is very much an enthusiast's machine and even with modest effort is capable of being programmed to a high standard.*

Due to its length the !WordCheain program cannot be reproduced here. Archimedes subscribers will find it on this month's *Micro User* disc.

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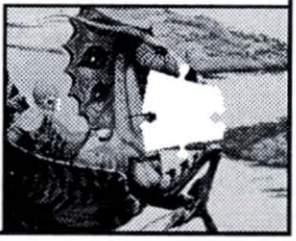

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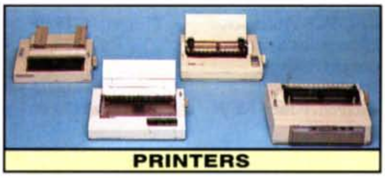
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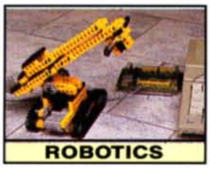
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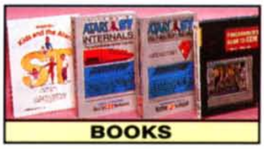
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Citizen Swift 24 Colour	£13.75
Panasonic KX-P1124,1081	£7.50
Star LC10	£3.80
Star LC10 Colour	£5.75
Star LC24	£4.75

Books (No VAT)

Programmers Reference Manuals	£75.00
BASIC V Guide	£18.95
A3000 Technical Guide	£28.95
Basic V: A Dabhand Guide	£9.95
Archimedes First Steps	£9.95
Archimedes Assembly Language	£14.95
Extra Manuals	
Acorn D.T.P.	£10.00
1st Word Plus	£10.00
ANSI C Release 3	£20.00
Logistix Part 1	£10.00
Logistix Part 2	£10.00
ISO Pascal Release 2	£8.00

Cables (Archimedes)

Acorn & Philips Monitor + Audio 2m	£8.65
Parallel Printer Cable 2m	£5.25
Arc to BBC Serial 2m	£6.95
Arc Keyboard Extension Cable 2m	£7.75

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7th - 9th September 1990

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Moss Side Employment Centre
Leyland
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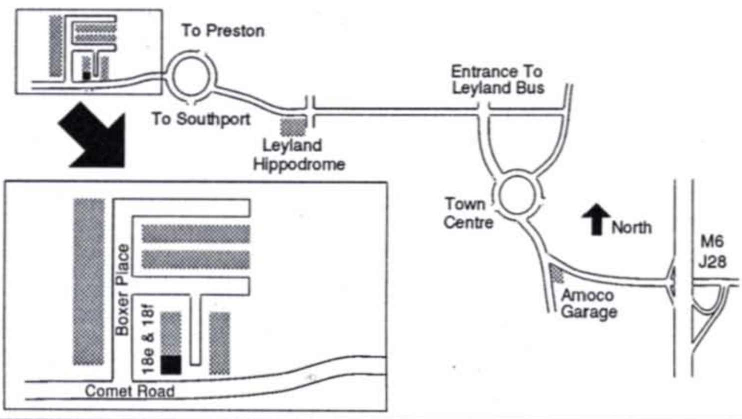

Until 6th August please forward all correspondences to :
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Preston, PR5 1LP.
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On the BBC Micro

WHEN it first appeared the BBC Micro was acknowledged as having the best sound system of any home computer. Since then it has lost its leading position, but the quantity of dedicated hardware and software still continues to increase.

Hybrid Technology

THE Hybrid Music System is unique in the world of computer music. It is a self-contained system which is entirely driven from software running only on the BBC Micro.

One of its major features is its ability to store both voice sounds and music together conveniently as one file, something few other music systems can do. Partly because of this, its flexibility and its low price, the Hybrid Music System has become the de facto standard computer music system in education.

The basic unit is the Music 5000 which can produce 16 channels of sound. These are usually paired to give eight voices – eight-part multi-timbral in Midi-speak.

The system runs under a language called Ample (Advanced Music Production Language and Environment) housed in the Ample Nucleus rom and the software includes a number of easy-to-use front end modules to help you create music.

You can enter notes on the stave in traditional notation in the Stave Editor or in Notepad, a text-based music editor, using Ample's own MCL – Music Programming Language. There is also a computerised Mixing Desk which lets you adjust tempo, transposition and each voices' volume and pan position in the stereo image.

The Music 4000 keyboard lets you record music in real time and then edit it using Ample's programming facilities.

The Music 3000 adds another 16 channels of sound to the system, effectively giving you a 32-channel, 16-voice synthesiser.

The Music 2000 is a Midi interface which lets you apply Ample's powerful programming techniques to synthesisers, expanders and other Midi devices.

The Hybrid Music System is the most powerful, affordable music system running on any computer. It can be used at a very basic level – for example, to mix a pre-recorded piece of music – as well as for highly sophisticated musical applications.

It can integrate music and graphics and produce computer-assisted compositions, teaching aids, sophisticated Midi instrument control programs and perform many other functions which can be accomplished by a computer language.

One of Hybrid's most recent releases is the Ample Toolbox, a collection of extensions to the Ample Nucleus and Studio 5000 software. It contains three new Ample modules plus two programs.

The modules include TEDIT, a full-screen text editor which lets you scroll up and down and left and right through the text. It can hold several words – Ample program instructions – at the same time making it easy to merge and split word definitions.

IEDIT is an image editor for creating Mode 7 graphic screens. It's quite sophisticated and rivals many dedicated teletext screen designers.

The Utils module includes a line editor which provides a command-driven method of entering words, plus eight extra system words. These include MERGE (self-explanatory), COMPILE (which reduces the size of a program and may make it unlistable), DECOMPILE (to make it listable again) and SPARESHOW and SPARE-DELETE to help removed unused words.

The two programs include an Ample program recovery utility and SideMod which lets you store Ample modules in sideways RAM. This is incredibly useful, especially if you use DFS and even more so if you only have one disc drive.

Hybrid's most recent release is the entry level Music 5000 Synthesiser Universal which uses the Music 5000 hardware with software which resides in sideways ram. It runs in conjunction with all correctly-written BBC Micro music programs and channels their sound to the Music 5000.

If you don't have an external amplifier, it will play the Music 5000 sounds through the internal speaker, which makes it a very cost-effective system, especially for education.

New releases include Soundspace and Soundscape, programs for the mentally and physically disadvantaged.

Hybrid also publishes around 20 albums of music (£4.95) created by HMS users. Panda Discs has more than a dozen Ample albums (£6.00) in its catalogue and there are a few independent music album publishers such as JB Software, which is the outlet for John Bartlett's excellent Jazz discs and Impressions album (£3.50).

Hybrid Technology Ltd, 273 The Science Park, Cambridge, CB4 4WE. Tel: 0223 420360.
Panda Discs, Four Seasons, Tinkers Lane, Brewood, Stafford, ST19 9DE.
JB Software, 20 Crawley Avenue, Wellingborough, Northants, NN8 3YH.

ElectroMusic Research

EMR was one of the first companies to develop Midi software for the BBC Micro. There are currently over a dozen programs in its catalogue falling under the generic heading of Miditrack. In most cases each piece of software and hardware can be used in conjunction with the rest.

Each program is purpose-written and

On the Archimedes

THE number of hardware Midi interfaces available for the Archimedes far outnumber available sequencer programs. Many companies have been concentrating instead on sample-based programs, which are far easier to write than Midi sequencers.

Not all software will run with all interfaces. Acorn's interface for the I/O podule is probably the least compatible. Before you make a purchase check interface compatibility with the software supplier. The safest bet is to buy the software supplier's interface – most have their own – but check compatibility with any program you may consider buying in the future.

ElectroMusic Research

EMR continues its policy of supporting Acorn products with a growing range of music software for the Archimedes. These come under the generic heading of the Arpeggio Music System and includes:

EMR Midi 2 Interface Card £79.90. Supports two separate Midi ports for 32 Midi channels. Single podule width.

EMR Midi 4 Interface Card £129. A full-width card supporting four Midi ports (won't fit directly into an A3000).

EMR SMPTE Card £149. Provides industry standard sync-to-tape facilities and time code for audio and video tape

EMR Sampler 8 Card £126.50. 8-bit monophonic sampler for use with Soundsynth. Dual sample rates of 22kHz and 44kHz. A version is being developed for the A3000.

Studio 24 Plus (Version 1) £99. A 24-track real-time biased sequencer which can also play back using the Archimedes' internal sounds.

Studio 24 Plus (Version 2) £149. Provides extra facilities such as on-screen notation and printout to an Epson-compatible printer, Midi keyboard remote control, drum grid and compatibility with several optional graphics pages such as Vu-Music.

➤

cannot be extended like Hybrid's Ample programs, however as dedicated software some people may find them easier to use.

Here's a run-down of the major items:

BBC Midi Interface £79.90. Connects to the BBC Micro's User Port and 1MHz bus. It has one Midi In and two Midi Out sockets plus sync facilities.

Performer £49.95. An eight-track real-time biased sequencer.

Pro-Performer £69.95. A 16-track real and step-time sequencer with software on rom.

Composer £29.95. A six-track step-time sequencer. Accepts input from the computer or a Midi keyboard.

Notator £29.95. Individual track notation for the Composer.

Vu-Music £14.95. Converts external Midi input to on-screen graphic displays. It's a stand-alone program which doesn't run with any of the sequencers.

Scorewriter £129.00. Two roms plus utility disc. Allows the construction and printout of scores. Two additional utility discs are available. Disc One (£19.95) converts music to Performer format. Disc Two (£39.95) prints out Performer tracks

Handimusic 1 £29.95. Composer for the handicapped which is controlled by a single switch.

Singad £99. Developed for education, the system monitors vocal input and gives visual feedback of the pitch.

Voice editors are also available for the following instruments: Yamaha DX7 and TX7 synthesisers; Yamaha FB-01 expander; Casio CZ101, CZ1000, CZ3000, CZ5000 and CZ1 synthesisers; Roland MT32. All editors are £29.95 each.

ElectroMusic Research, 14 Mount Close, Wickford, Essex, SS11 8HG. Tel: 0702 335747.

Umusic

UMUSIC's range of Midi programs for the BBC Micro were originally designed for the professional market, although they can be used by anyone.

There are two main packages which include both Midi interface and software and each has an optional Micro Editor which offers various edit facilities such as altering pitches, velocities and timings.

All software is in rom and the programs are therefore instantly available by entering *UMI. It takes the unusual but useful step of using shadow ram for note storage to compensate for the BBC Micro's limited memory, giving a very respectable 52k for music storage on machines that have the extra ram.

UMI is a pattern-based sequencer which lets you create up to 127 patterns of varying lengths and join them together to form a track. The system supports up to 16 tracks each of which can be routed to a different synthesiser.

The Stave Editor/Display rom – £120, but free to educational establishments – offers sophisticated note display and scorewriting facilities.

Umusic also has a range of system exclusive dumps which allow you to store synthesiser voice data on disc and save a fortune in ram packs.

Dumps are available for Yamaha's DX7, DX11, DX21 and DX100 (£30 each) and Roland's MKS70 (£40), MKS80 (£50), Juno 106 (£40), D50 (£50) and D110 (£50). Casio CZ dumps will be supplied free.

There is also a Universal Dump (£150) for synthesisers which do not require two-way communication.

UMI-3s	£200.00
Micro Editor for 3s	£96.00
UMI-4M	£280.00
Micro Editor for 4M	£120.00

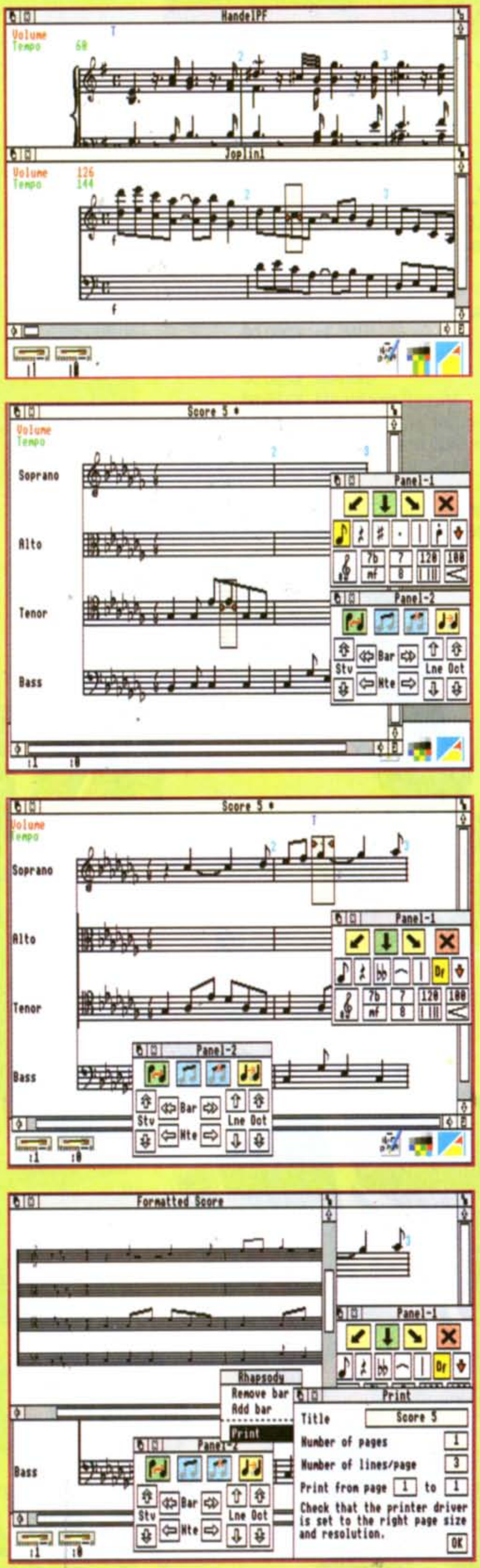
A super version of the 4M is also available for £600 which supports Midi Time Code.

All prices include p&p but exclude VAT.

Umusic Ltd, 17 Parkfields, London, SW15 6NH. Tel: 081 788 3729.

Making Music

In this comprehensive overview of the Acorn music scene, Ian Waugh describes all the major products available for both the 8 and 32 bit machines



Print

Title: Score 5
Number of pages: 1
Number of lines/page: 3
Print from page 1 to 1
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Example pages from Rhapsody

It is also SMPTE-compatible when used with EMR's SMPTE card.

Soundsynth £49.95. Allows the creation of internal waveforms for use with EMR programs and Maestro.

Creations Sample Disc Library £6.95 each, all six for £49.95. A six-disc set containing a wide range of music and sound effects. Disc 1, 34 mixed sounds; Disc 2, 38 orchestral and acoustic instruments; Disc 3, 27 animal noises and human voices; Disc 4, 28 spectacular sound effects; Disc 5, 22 more spectacular sound effects; Disc 6, pop, Latin and orchestral percussion.

Handimusic 1 £29.95. For those with special needs. A melody can be created by tapping a single switch.

Scorewriter PMS £499. Produces full-score notation printout using a text-based language. Requires an Arc word processor and Postscript laser printer.

Vu-Music £14.95. Produces graphic displays from incoming Midi data. A module is available to let it run from within Studio 24 Plus Version 2.

Rhythms Box £29.95. Stand-alone program which uses the Archimedes' internal sounds to create drum patterns on a grid. Can't transfer patterns to Studio 24.

Symphony £9.95. Demonstration disc containing a variety of music which can play back via Midi or with the Arc's internal sounds.

ElectroMusic Research, 14 Mount Close, Wickford, Essex, SS11 8HG. Tel: 0702 335747.

Clares Micro Supplies

Armadeus Software £79.95. **Armadeus Sampler Board** £149.95. Armadeus is sound sampler software which can be supplied with a sampler board as well. It runs under Risc OS and allows quite sophisticated manipulation of samples. It can read a wide variety of sample formats including those on Atari ST discs.

Editing facilities include zoom, telescope, append, overlay, reverse, echo and fade in and out. There are filter options to help produce clean samples and a resampling feature can reduce their size.

The software is compatible with Armadillo, Unilab and Wild Vision sampler boards as well as its own Armadeus board.

Rhapsody is Clares music composition and playback software. It allows you to compose in full manuscript notation – with few limitations – on up to 24 staves. Playback can be through the Archimedes or A3000 sound system or though a Midi instrument.

It will input Maestro music files and convert them to Rhapsody format. Its facilities far outstrip Maestro. Fully working versions of this program exist; it's due to be released in September.

There's a demo version on this months subscription disc for the Archimedes.

Clares Micro Supplies, 98 Middlewich Road, Rudheath, Northwich, Cheshire, CW9 7DA. Tel: 0606 48511.

MJD Software

THE **Archimedes Voice Generator** (£59.95) is an excellent utility which lets you create sounds in standard Archimedes Relocatable Voice Modules which can be

Suppliers codes for Product Guide

ACO	Acornsoft, 645 The Technopark, Newmarket Road, Cambridge. Tel: 0223 214411.
ADV	The Advisory Unit, Microtechnology Education, Endymion Road, Hatfield, Hertfordshire, AL10 8AU. Tel: 07072 65443.
AVP	AVP Computing, School Hill Centre, Chepstow, Gwent, NP6 5PH. Tel: 0291 625439.
BBG	Beebug Publications, Dolphin Place, Holywell Hill, St Albans, Herts, AL1 1EX. Tel: 0727 40303.
CAM	Cambridge Software House, Town Hall, St Ives, Huntingdon, Cambridgeshire, CB2 2RU. Tel: 0480 66805.
CHA	Chalksoft, PO Box 49, Spalding, Lincolnshire, PE11 1NZ. Tel: 0775 769518.
COL	Collins Educational, 8 Grafton Street, London, W1X 3LA. Tel: 071-493 7070.
ESM	esm, Abbeygate House, East Road, Cambridge, CB1 1DB. Tel: 0223 65445.
ESP	ESP, Holly Tree Cottage, Strelley Village, Nottingham, NG8 6PD. Tel: 0602 295019.
FIS	Fisher-Marriott Software, 3 Grove Road, Anstey, Warwickshire, CV7 9JD. Tel: 0203 616325.
GAR	Garland Computing, 35 Dean Hill, Plymouth, Devon, PL9 9AF. Tel: 0752 401287.
GRE	Greenweld Electronics Ltd, 443 Millbrook Road, Southampton, Hampshire, SO1 0HX. Tel: 0703 772501.
HYB	Hybrid Technology Ltd, 273 The Science Park, Cambridge, CB4 4WE. Tel: 0223 420360.
IND	ndependent Software, 26 Eason Drive, Abingdon, Oxfordshire. OX14 3YD. Tel: 0235 35035.
TED	Ted Kirk, 33 Humber Crescent, Sutton Leach, St. Helens, Merseyside, WA9 4HD. Tel: 0744 818761.
LON:	Longman Logotron Ltd, Dales Brewery, Gwydir Street, Cambridge, CB1 2LJ. Tel: 0223 323656.
MED	Microelectronics Education Development

used in a wide range of music programs. It is Risc OS compatible but not multi-tasking although it is mouse-driven.

Its functions are split into a number of different sections. The Realtime Synthesis Editor is used to create Relocatable Voice Modules containing up to eight voices from a combination of waveforms, amplitude and pitch envelopes.

The Interpolation Editor combines a number of waveforms, transforming one into another. The Harmonic Editor allows you to create sounds by selecting up to eight harmonic partials each with its own amplitude envelope. The Sample Editor is where you can manipulate and edit a sound sample.

MJD Software, 13 Burnham Way, West Ealing, London, W13 9YE.
Tel: 081 567 4284.

Armadillo Systems

ARMADILLO specialise in samplers and has produced four models for the Archimedes.

Mono A448 plus Adit software £135.00 is a single width podule plus sampling/editing software. Sample rates range from 4.6kHz to 41kHz with band filters giving a bandwidth of 15kHz. The Adit software includes cut and paste edits, reverse, echo and mixing.

Stereo A448b plus HighNote software £165.00 is similar to the A448 but samples in stereo. The HighNote software is icon-based and consists of a number of modules which perform a range of functions including sampler/edit, disc and memory management, voice set up/Midi and an envelope module. Other modules are in development.

Stereo + Midi A448m plus HighNote £195.00. Similar to the A448b but including a Midi port with In, Out and Thru sockets. This allows sounds to be controlled by external Midi equipment.

A616 £1295. A 16-bit, rack-mount sampler which uses the HighNote software running on the Archimedes. It supports multi-timbral keyboard splits with eight-part polyphony and velocity sensitivity.

Spectre SFFT £60.00. This is a software package to compliment the A448 samplers. It performs Fast Fourier Transforms on samples. FFT splits a sample into its harmonic components and displays it in impressive 3-D graph form.

All prices exclude VAT.

Armadillo Systems Ltd., 17 Glaston Road, Uppingham, Rutland, Leicestershire, LE15 9PX. Tel: 0572 822499.

Acorn Computers

MAESTRO is the cheapest Archimedes music/Midi program available. It is free with Risc OS, and for a freebie is not at all bad. It lets you create music on the stave and play it back using the Arc's internal sounds.

If you have a Midi interface the program will detect it and offer you a Midi option in the Instruments menu to let you select the channels each voice will transmit on. It's an ideal – and cheap – way to take your first steps in Midi.

Product Guide

The following pages give a comprehensive product guide to 8 bit BBC Micro hardware and software.

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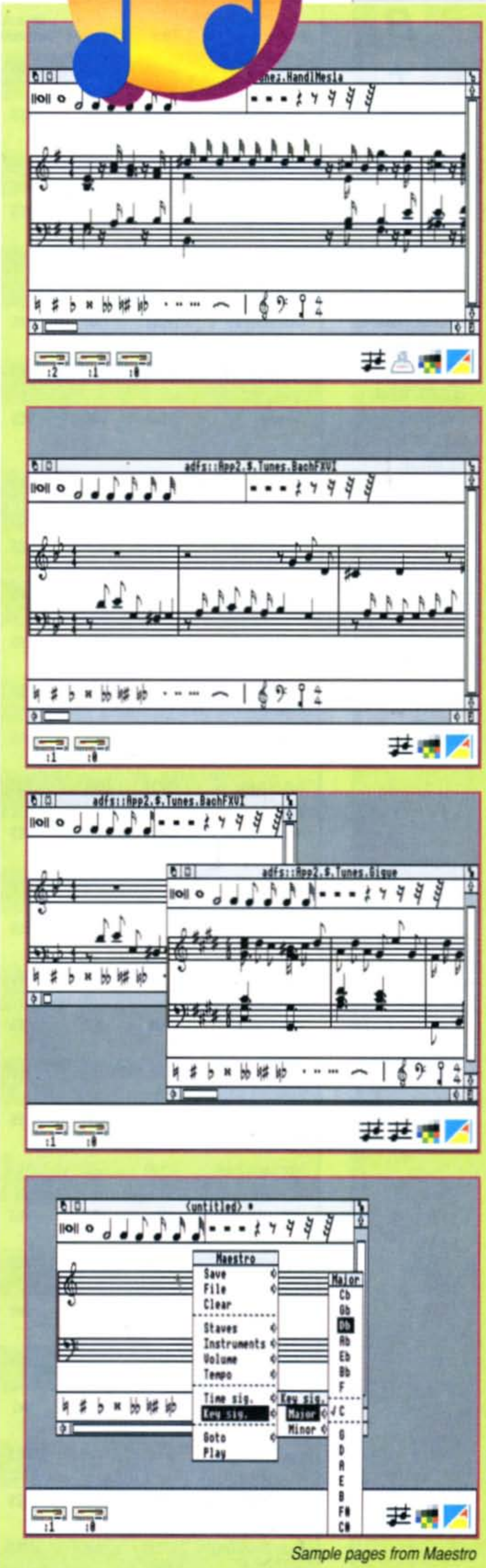
Unit (MEDU), Bishop Grossteste College, Newport, Lincoln, LN1 3DY. Tel: 0522 44713.
MMU Micro Musical Ltd, 'Cedar Lodge', Lutterworth, Bramcote, Nuneaton, Warwickshire, CV11 6RB. Tel: 0455 220922.
MVT Microvitec plc, Futures Way, Bolling Road, Bradford, West Yorkshire, BD4 7TU. Tel: 0274 390011/726500.
MID Mid-Sussex Music Software, 11 Bridle Way, Pound Hill, Crawley, West Sussex, RH10 4HP. Tel: 0293 882130.
MEC Music Education Centre, The University, London Road, Reading, Berkshire, RG1 5AQ. Tel: 0734 875855.
MUS Musicality Software, Cheddington Road, Edmonton, London, N18 1LT. Tel: 081-803 9449.
MUZ MUZZsoft, 69 Riley Road, Brighton, East Sussex, BN2 4AG. Tel: 0273 699768.
NOT Note Perfect Software, 97 Valence Road, Lewes, Sussex, BN7 1SJ. Tel: 0273 473135.
PER Perfect Fourth Software, 11 Hempstead Lane, Potten End, Berkhampstead, Hertfordshire, HP4 2QJ, Tel: 0442 866311.
PIT Pitman Publishing Ltd, 128 Long Acre, London, WC2E 9AN. Tel: 071-379 7383.
RCE R.C.E.V.H. (Research Centre for the Education of the Visually Handicapped), School of Education, PO Box 363, Birmingham, B15 2TT. Tel 021- 414 6733.
RES RESOURCE, Kingfisher School, Exeter Road, off Coventry Road, Doncaster, DN2 4PY. Tel: 0302 340331.
SHR Sherston Software, 8 Court Street, Sherston, Malmesbury, Wiltshire, SN16 0LL. Tel: 0666 840433.
SYS System Software Ltd., Fifth Floor, Sheaf House, Sheaf Street, Sheffield, S1 2BP. Tel: 0742 768682.
TOB Tobin Music Systems, The Malthouse, Knight Street, Sawbridgeworth, Hertfordshire, CM21 9AX. Tel: 0279 726625.



Sample pages from Maestro

This table shows what music hardware and software is available for the BBC Micro, who supplies it, and how much it costs.

Program	Price[1]	Supplier[2]	Universal compatibility[3]	**Description**
AMPLE Compose	£26.45	ESP	YES	A version of the Compose program that works as an integral part of the Music 5000 Synthesiser/Music 4000 Keyboard system, taking advantage of its high quality sounds and allowing greater control over material created with Compose facilities. Requires Studio 5000 Software Pack.
Aural Grades 1 & 2, 3, 4, 5.	£14.85 to £19.85	PER	YES	Help in graded aural examinations of the Associated Board. You must sing pitches and intervals which are played by the computer and selected at random. Can demonstrate correct method of beating time.
Aural Tests Grades 1, 2, 3 and 4	£19.50	IND	YES	Helps students taking Associated Board exams to practise pitch, melody and rhythm memory, interval recognition, and beating time. Also provides computerised versions of the tests.
Aural Training Tutor 1, 2, 3 and 4	£24.50	AVP	YES	Provides graded aural exercises in specific skills. Can be used either as a controlled aural lesson or as individual support for GCSE and A level students.
Basic Music Composition	£11.95	TOB	YES	Easy-to-use program that lets you compose melodies on the stave and play, store and print them. Provides a chordal accompaniment and the format ensures even beginners can produce musically pleasing compositions. Pieces can be used in a variety of classroom activities. Provides a fuller accompaniment when used with the Universal.
Chord Processor	£15.00	CAM	YES	Helps in composing chords sequences using predefined three-note chords, an optional drum-beat and settings for volume, tempo, beat, pitch, instrumental colour, tuning and chord pattern.
Chord Recognition	£17.50	AVP	YES	Tests your ability to identify major and minor chords by playing a chord and checking the answer entered on the computer keyboard. Offers three levels of difficulty and a volume control option.
Compose	£15.00	ESP	YES	Encourages musical invention, particularly in young children, through a combination of picture, sound and a simplified form of notation. Can use an optional Midi Interface, the K1 (requires Midi synthesiser), or Music 5000 Synthesiser Universal. Special Needs version uses Concept Keyboard (overlays supplied) or single/dual switch.
Compose Play	£20.70	ESP	YES	Leads on from Compose by organising pictures representing short phrases to make a melody and harmony in up to three parts, plus a percussion track. Can be operated by a variety of input devices, can use material from Compose and Rhythm Maker, and can use the optional Midi Interface K1 (requires Midi synthesiser) or Music 5000 **Synthesiser Universal.**
Compose Tune Files, Disc 1	£9.20	ESP	YES	Twenty sets of phrases for use with the Compose and Compose Play programs covering a wide variety of styles and activities.
Composer	£16.50	RES	YES	Music writing program that allows you to create tunes and present them in high quality score on screen and paper. Features include different key and time signatures, beamed notes, accidentals, repeats, and a wide range of sound control options.
Creative Sound on the BBC Micro	£9.95	ACO	YES	Book which investigates the range of musical applications to which the unexpanded BBC Micro can be put. Includes around 40 programs from keyboard synthesisers to composing tools.
Exploring Music on the BBC Micro	£9.95	PIT	YES	Book of ideas for creating music through simple use of Basic covering a very wide range of styles and activities.
Grade 8 Aurals	£24.50	AVP	YES	Gives students practice in answering questions for the aural part of the Associated Board's examination. Includes melody singing, describing intervals, remembering rhythms, recognizing time signatures, chords and modulations.
Guitar Chords	£17.50	AVP	YES	Instantly see and hear any of 144 guitar chords of 12 types and tests your knowledge of how to finger them. The program can be used for teacher demonstration or individual use.
History of Music	£24.50 each	AVP	YES	A series of eight discs giving a basic understanding of the repertoire and characteristics of the music of various eras from late Renaissance to 20th century. Each contains information programs, a game and musical examples and analyses.
Jolly Jack Tar	£15.18	SHR	YES	Six easy-to-use games to help young children understand and learn about the musical concepts of rhythm and pitch. Can be a particularly useful teaching aid for use with children learning to play instruments.
Keyboard Player	£19.95	CHA	YES	A computer-assisted learning course designed to introduce the beginner to the musical keyboard. Includes key identification, fingering techniques, five-finger exercises, adding rhythm and playing chords.
Logosounds	£13.80	ADV	YES	Extends the Logo computer language to allow users to explore sound patterns, such as scales and ostinati, program the computer to play tunes and chords and create their own sounds from the computer. Requires Logotron Logo rom.
Micro Maestro	£4.95	GRE	YES	Practice aid based on the same principles as Recorder Tutor but suitable for a wide range of instruments. Includes automatic computer screen scores and professionally recorded backings for six contemporary pop classics.
Micro Music	£13.80	FIS	YES	Introduction to music notation and timing for complete beginners. Includes six games, four special sequences to teach the names of note pitches and values, and the option to play and print-out the user's own written tune.
Micro Musician ML-25	£28.65	MMU	YES	An aid for professional teaching of notation and music theory, allowing musical compositions in up to eight parts to be created, played (three parts only without extra equipment) and printed out in high-quality stave notation in a variety of formats on an Epson printer.
Microspecial Music	£25.30	COL	YES	Provides a medium for musical self-expression and creativity in composing tunes for MLD pupils of 14 to 16 years and younger more able pupils. Allows tunes to be built up on the stave, modified, played, printed out and saved to disc. Requires a concept keyboard.
Music	£N/A	MVT	YES	Uses the touchscreen to provide a menu-driven music synthesiser with an on-screen keyboard that can actually be played by lightly touching the screen. Supplied free with the Microvitec Touchtech 501 touch screen.
Musical Dictation 1	£19.00	MUS	YES	Aural training package which teaches how to take down simple tunes in notation. Includes 24 teaching and testing programs with exercises covering pitch, rhythm and pitch with rhythm. Suitable for all ages but requires elementary knowledge of notation.
Music LOGO	£17.25	LON	YES	Extension to Logotron Logo giving access to the computer's sound generating facilities through 51 music primitives controlling amplitude or loudness, pitch and timing. Requires Logotron Logo rom.
Music Processor	£54.95	MID	YES	Prepares printed scores of up to eight staves using all basic music symbols plus double accidentals, double dots, four types of clef chords, level or sloped beams and manual or automatic positioning. Requires Epson-compatible printer.
Music System	£20.00	SYS	NO	Comprehensive two-disc package which lets you create and print compositions using a stave editor, sound designer, keyboard, linker and printer modules. Includes several example compositions.
Music Teacher	£17.50	AVP	YES	Six programs which make it fun to read and write music. Covers naming note pitches, identifying keyboard keys, key signatures, note values and polyrhythms. Also includes a test for speed and accuracy of sight-reading.
Music Theory - Hints and Tests	£19.50	IND	YES	Suite of revision programs for theory of music exams aimed at Grade 5 but usable for Grades 2 to 7. Two discs cover keys, bars, rests, scales, terms, intervals, chords, cadences and transposition.
Music Theory Tutor 1, 2, 3 and 4	£17.50 each	AVP	YES	Series of discs covering a wide range of graded topics in music theory through tutorial sequences (with musical examples) and tests.

Program	Price[1]	Supplier[2]	Universal compatibility[3]	**Description**
Music Tutor	£12.95	GAR	YES	Allows the writing of compositions using the computer keyboard as a music keyboard. Automatically places each note on the stave with the correct pitch and duration. Notes can also be entered by typing the letter name and duration. Tunes may be easily edited, barred, stored and printed on Epson-compatible printer.
Name-It	£6.00	MUZ	YES	Designed to help teachers familiarise younger pupils with the letter-name geography of the keyboard and reinforce this knowledge through repetitive recognition. Includes an arcade-style game to encourage pupils to look upon learning the notes as fun.
Note Invaders	£14.95	CHA	YES	Package of music programs which introduces the stave and asks the user to give correct note names. Includes an arcade-type game based on the classic Space Invaders which tests note-reading skills on a choice of treble or bass clefs.
Note Perfect	£9.95	NOT	YES	Plays scales and studies as practice for solo instrumentalists such as violinists, oboists, and trumpeters. Includes 200 exercises. Uses BBC Micro sound chip which is out of tune but with the Music 5000 Universal the pitch is correct.
Opus	£15.00	ADV	YES	A powerful, versatile and easy-to-use music composition program that allows you to create, combine, manipulate and edit musical ideas in a variety of ways. Its polyphonic graphic score format requires no knowledge of stave notation and the use of sequenceable "cards" provides control of structure and form.
Pazazz	£14.95	ESM	YES	A suite of comprehensive programs for creating miniature on-screen multi-media performances complete with stage set backgrounds, animated figures and musical soundtracks. Includes three example performances.
Patterns and Change	£FREE to education	MEC	YES	Programs to help young children to perceive patterns and change in music. Each deliberately simple program is designed for use as part of a musical activity. In some cases aural patterns are offered with visual patterns to provide a link with graphic scores.
Peter Beater's Musical Games	£14.95	SYS	NO	Pair of musical games designed for infants upwards. Melody Rainbow provides a simple way of entering and editing a tune note-by-note for performance by the computer. Musical Jigsaws challenges the child's understanding of musical pitch using animated sequences.
Picture Music	£14.50	RES	YES	Allows tunes to be built up using packages of notes selected from the pentatonic scale. These are represented by pictures chosen from objects that might be seen during a train journey, the names of the notes or stave notation itself. Pieces may use melody, accompaniment and rhythm lines, and be saved and printed.
Pitch Trainer	£12.50	MID	YES	Helps develop sight-reading of pitch and recognition of intervals through two types of test: *Does the computer play right or wrong?* and *Name the interval.*
Play What I Play	£7.95	TED	YES	Aural practice program for music pupils up to GCSE and Grade 5 suitable for a wide range of ability, attainment levels and ages. Challenges and develops relative pitch perception, melodic memory and the ability to relate notes heard to notes visually presented on a glockenspiel, keyboard and stave.
Playbeeb	£7.95	MID	YES	Informal and fun introduction to the musical stave and keyboard for 3 to 7-year-olds. Plays favourite nursery rhymes or music, displaying the notes on the stave and on a picture of the piano keyboard.
Reading Music 1	£25.00	MUS	YES	Eighteen programs in seven parts on four discs. Teaches music theory from basics such as rhythm and pitch up to key signatures, tonic triads, musical terms and signs.
Read-It!	£6.00	MUZ	YES	Designed to help teachers encourage pupils to become more fluent in reading music from stave notation on to a keyboard instrument. Introduces F and C clefs, leger lines, key signatures, double-sharps and so on, using a fun-to-play arcade game against the clock.
Recorder Tutor	£7.95	GRE	YES	Turns the computer into a recorder practice aid, presenting exercises and music scores on screen. The computer automatically turns the pages of the score as you play to its metronome or it plays its own performance of the melody. Includes printed scores and professionally recorded backing tapes for 52 pieces.
Rhythm and Pitch	£17.50	CHA	YES	Programs to help people of all ages develop their ear for the basics of music composition using pitch and rhythm tests. They measure your response and adjust to an appropriate level of difficulty.
Rhythm Maker	£20.70	ESP	YES	Supports rhythmic invention from an elementary to very complex level by providing a time grid upon which you can create percussion patterns which can be linked to make a complete composition. Work can be transferred to the Compose Play program. Can be operated by a variety of input devices and can use the MIDI Interface K1 or Music 5000 Synthesiser Universal.
Rhythm Tutor	£12.50	MID	YES	Helps teach you to read rhythm by displaying up to four bars of rhythm on the screen in standard music notation (with quavers joined where appropriate) and presenting two types of test: *Is the computer right or wrong?*, and *Play it yourself*, in which the computer marks your mistakes on the score.
Recomposer	£12.50	MID	YES	Provides a way to experiment with melodies and harmonies. Starting from any one of twenty musical pieces displayed on the screen in up to four staves, you may *recompose* by adjusting the pitches of any notes.
Soundscape	£33.35	HYB	YES	Composition software offering a wide range of high-quality sounds through a simple language of colour. Keyboard performances using them can be recorded, stored, and replayed. Intended to encourage listening, performing and composing in children from infants upwards, including handicapped. Requires Music 5000 Synthesiser/Music 4000 Keyboard.
Soundspace	£33.35	HYB	YES	An open-ended musical environment providing access to a wide range of sounds through the media of touch and movement plus conventional keyboard performance. Intended to encourage creativity in children from infants upwards, particularly the handicapped. Requires Music 5000 Synthesiser and either Microvitec Touchtech 501 touchscreen, or joystick. Can use optional Music 4000 Keyboard.
Sounds Useful	£20.00	MED	YES	Three integrated programs intended to promote musical thought, exploration and activities: Synthesiser uses the computer as a musical instrument; Ostinato creates, repeats and modifies musical phrases and Sequencer builds compositions from Ostinato phrases with a variety of transformations.
Studio 8	£16.50	BBG	YES	Allows compositions to be built up note by note using the computer as a music keyboard. Up to eight parts may be created and up to four replayed at any one time using a variety of sound shapes.
Theory of Music Level 1	£13.50	TED	YES	Designed for use by an individual with minimal or no immediate supervision to prepare for a first Theory exam. Its two main parts deal with pitch and rhythmic notation and it includes a multiple-choice quiz on terms and signs.
Theory of Music Questions & Exercises, Grades 2 to 5	£13.50	TED	YES	Assists with learning the theory of music particularly for Associated Board examinations. Sets questions and checks answers on a wide variety of topics from the writing of key signatures to the layout of root position chords on two staves.
Toolbox	£39.10	HYB	YES	A set of programs adding extra facilities to the Hybrid Music System including a picture editor that lets you add graphic accompaniments to computer compositions. Requires Studio 5000 Software Pack.
Touch 'n' Listen	£10.00	RCE	YES	An early introduction to the touchscreen or Concept keyboard for the very young or handicapped. It associates segments of a tune with different areas of the touchscreen, allowing the tune to be reconstructed by touching each area in turn. Includes 22 well known tunes.2

[1] All prices include VAT but not p&p **[2] Index to suppliers on previous page** **[3] Universal Compatibility refers to Hybrid's Music 5000 Synthesiser Universal**

Power Pills

- Castle Quest hints and lotsa lives for disc versions
- Alerion level jump
- Terramex infinite lives
- Master sideways ram problems solved
- Perplexity bug fix for 5.25in disc version

On Castle

MENTION arcade-adventures and probably the first examples of the genre that spring to mind are the two Superior Software giants Citadel and Exile – now available as a subscription offer. However, one such game that was in its time every bit as revolutionary as Exile is Micro Power's Castle Quest.

Its pioneering influence was such that many of the features we now take for granted, such as super-smooth sideways-scrolling, had never previously been seen in a BBC Micro game.

It is probably a tribute to the longevity of Castle Quest that although Tony Sothcott, its author, has long since moved on I still receive quite a few letters with hints, tips and requests for help.

The fact that it is one of the few major games that has never been re-released on any compilation, so that it has never received more than its initial burst of publicity, makes Castle Quest all the more remarkable.

When I compiled the summaries of my first three years columns, as featured in the April, May and June 1990 issues I noticed that in only one column in three and a half years had I featured any tips for Castle Quest, so here are some more hints for this intriguing game: I hope they make up for the delay.

In November 1989 I covered the steps necessary to obtain the sword and to cross the troll's bridge, so I will not go into these details again, except to say that the four little men are scared of fire.

You can swim in the moat for any length of time without drowning as long as you are wearing the aqualung. This is located in an area of the castle populated by red guards to the far right of your start point.

The aqualung is propped quite close to the wall in the top right-hand corner of the screen, so that it is not very easy to see unless you know what you are looking for.

The wizard seems to have confused a few readers, one of whom commented:
" But when I get to the wizard he refuses to let go of the wand". This is probably because, apart from the occasional brief appearance, the wizard plays no active part in the game. The wand is guarded by the witch, who lives quite a way to the left of the spiders' cave. The layout of the castle wraps around, and any point can be approached from either direction, so the witch can also be found to the bottom-right of the section of the castle where you find the aqualung.

However, although it is perfectly possible to approach her from either direction, as soon as you reach the bottom of the ladder by the gold coin you will be dead before you know what has hit you. So you must approach from the side of the spiders and lure her back into a narrow passage to the right of the pillars from which she cannot escape.

You kill her by throwing the water-filled bucket at her, an idea no doubt inspired by the famous sequence from The Wizard of Oz. Note that you must let her get as close as you dare, because she's extremely adept at dodging flying buckets.

I have frequently been asked if it is really necessary to get captured by the guards and go through the routine of escaping from the prison. The answer is an emphatic ***yes*** because the wizard's wand is located between two sections of brickwork from which you can escape only by standing on the stool, which is located inside the prison cell.

Once you have the wand, climb up the ladder past where you found the gold coin, swim the moat and get back to the point to the right of the troll's bridge where the wizard made one of his appearances.

Climb down a ladder to where you will meet two yellow guards. Defeat them then throw the wand at the right-hand wall. The brickwork will reveal the ruby, gold bar and gold coin, with the message:

```
TREASURE FOUND GAME OVER
```

You'll be given a score of 110 points plus a time bonus, although I myself have invariably run out of time bonus by that stage.

Lastly, if any reader still cannot complete the game using the above hints, I hope the following infinite/extra lives routine will bridge the final gap. Incidentally, this routine also includes the Master-conversion routine that I originally featured in my June 1989 column, so it applies equally to owners of Master series machines. Happy hunting!

```
10 REM Castle Quest infinite/extra
lives
20 REM for "Opus" and Master-compa
tible disc versions
30 REM by Hac-Man 1990
40 REM (C) The Micro User
50 REM
60 IF PAGE=&2800 THEN GOTO 120
70 FOR I%=0 TO (TOP-PAGE) STEP 4
80 I%!&2800=I%!PAGE:NEXT
90 *KEY0 PAGE=&2800|M END|M OLD|M
RUN|F|M
100 VDU21:*FX138,0,128
110 END
120 L%=4:REM default number of liv
es - can be 1-255
130 FOR I%=0 TO 2 STEP 2:P%=&120:[
OPT I%
140 LDA# cont MOD 256 : STA &1805
150 LDA# cont DIV 256 : STA &1806
160 JMP &FFF7
170 .cont
180 LDA# &A9 : STA &58ED : LDA# 1
: STA &58EE : \ infinite lives
190 LDA# L% : STA &5996 : \ no. of
 lives
200 JMP &4340
210 ]:NEXT
220 MODE 7
230 PRINT "Please insert Castle Qu
est disc and hit any key...";:G%=G
ET
240 PRINT:*LOAD !BOOT
250 IF INKEY(-256)<None>
&A2 PROCconvert
260 !&E46=&A9012020:CALL &ED0
270 END
280 DEFPROCconvert
290 FOR I%=0 TO 2 STEP 2:P%=&E90:Q
%=P%:[OPT I%
300 .data :]:Q%=P%
310 FOR J%=0 TO 31:K%=J%*640:P%=(2
*J%)+Q%:[OPT I%
320 EQUB K%DIV256 : EQUB K%AND255
330 ]:NEXT:[OPT I%
340 .start LDX# &3F : .loop LDA &E
90,X
350 STA &C375,X : DEX : BPL loop :
 JMP &E00
360 ]:NEXT
370 ?&FE34=&18:REM allow access to
 filing system ram
380 ENDPROC
```

the Quest

Hac Man goes into troubleshooter mode and bags a bevy of game hints, tips and pokes

Memory problems

Many Master 128 owners will remember that in my March 1990 column I discussed how to modify the Master version of Elite so that it would use a bank of sideways ram other than bank 6, the default. This was to allow Elite to be run on a Master in which a rom had been fitted in the socket mapped over ram banks 6 and 7.

David Hutchinson has sent me a mailbox message in response to this article, to say that he is having problems loading Elite on his Master, even with John Sparrow's conversion routine featured in that column.

To quote David: "Since we changed a link in the computer to enable sideways ram we have been unable to load Elite. The planet logo appears, then the program announces 'Elite needs RAM in slot 6'. This is an empty rom socket".

In fact the Master is supplied as standard with all four ram banks enabled, so I suspect that by changing this link David has actually disabled the ram in banks 6 and 7.

If he has changed both rom/ram links under the impression that he was enabling the sideways ram, then no value of *bank* in John Sparrow's program will work correctly.

David goes on to say that he has tried to run the enhanced versions of Stryker's Run present on both the original and Play It Again Sam 1 discs on his Master, but neither would load. As the enhanced Stryker's Run stores data in all four ram banks, this would seem to be a likely explanation.

David also cannot get his Sam 1 copy of Citadel to run on his Master. It loads all the way and displays the title page, but when you press the Action key to start it blanks the screen and displays the heading *Main Hall* then locks up. In fact this is also a symptom of sideways ram being unavailable, but not banks 6 and 7 this time.

Citadel uses almost every spare byte of the micro's memory, and the version originally released by Superior in the pre-Master days used some very illegal techniques to squeeze just that little bit more out of the machine.

Consequently when programmer Chris Hart came to convert Citadel to run on the Master, there was simply not enough spare ram into which to put the routines necessary to do legally all the things that Michael Jakobsen, the author of Citadel, had done illegally.

Chris chose to store the extra code in sideways ram bank 5, so the only reason why Citadel would fail to load on the Master would be if ram banks 4 and 5 were disabled.

Just to make sure that my guesses were correct, I tried running all three games with the different combinations of ram banks enabled and disabled: All three games behaved exactly as David had described them when both ram/rom links were set to disable sideways ram. I hope this clears up the problem.

Perplexity, or just perplexing

Steve Hanson of Superior recently brought to my attention a bug that appeared in the very first release of the company's excellent Perplexity, the closest that we Beeb owners are ever likely to get to Pacmania.

The problem is actually causes by a single character in one of the screens being incorrect, but the screens are so fiendishly designed that even this minor change makes it insoluble. Any Repton player who fell foul of the one-byte bug in the COLONEL screen of Repton's jaunt through the Orient will know that my description is no exaggeration.

The bug appears on screen 8 on which you have two pairs of keys – two facing one way and two facing the other, with a section of wall in between each pair. In fact the wall section should not be there.

Fortunately, Steve has a bug fix for the disc version of the game, which is as follows: First remove the write-protect tab from the disc, then type:

```
*ACCESS D.PERP1
*LOAD D.PERP1
?&552B=80
*SAVE D.PERP1 1100 +6F00
RUN
*ACCESS D.PERP1 L
```

Put the write-protect tab back on the disc and hey presto! You now have a perfect working copy of the game.

32 bit power

Ben Hallifax of London has written to me with cheats for a couple of Archimedes games.

On **Alerion**, when the high-score table is being displayed on the screen, simply press any letter on the keyboard from A to O to start on the level corresponding to that letter.

On **Terramex**, wait until the game has finished loading, then before doing anything else, type:

```
SUBJECTTOCHANGE
```

exactly as shown, with no spaces. You now have infinite lives.

While on the subject of the Archimedes, I recently received a letter from a reader who said that I had been featuring a lot of pokes and tips for that machine in recent columns, and that he would like to see more for the 8-bit machines for which this magazine was originally launched.

I feel that it is necessary to try to cater for as wide a range of readers as possible. Indeed, I have tried quite hard over the years to cater for owners of the rather less well-established machines, such as the BBC B+ and the Master Compact.

Nevertheless, the vast majority of the material featured in this column comes from readers, whether as a request for help, a cheat routine or as general hints or tips.

Consequently, if my column is being read by Archimedes owners who have hints and tips that they wish to pass on to their fellow users, I can only feel that this must be good for the future of games-playing on the machine.

Sobering saga

The Mad Hatter plans to do a job and gets involved with some shady types

SOAPY was left more or less paralytic in last month's episode of *Dodgy Geezers* and now it is time to bring Part One of this amusing frolic in the depths of criminaldom to its climax.

Abandoning Soapy, we leave the nightclub and head for the Amusement Arcade: W, D, D, E, SW, SW, SW, S and SE are the moves required.

Here you'll meet Mr. Video who will say that he can't stop now but that he'll call you later. Make your way to the park by going NW, N, SW and W then *Wait* until Saturday morning (Turn 120) when the library opens.

Enter the library by going N and when the librarian asks if he can help you say *Yes* and when he asks what information you need reply *Sewers* to get the book needed.

Now move S (with the book) and then *Read book* to obtain details of sewer entries. It's time to go E, NE, S, E, NE, NW, NE, N and NW to the pub. Gucci shoes may well be lurking as you make these moves, so don't dawdle until you arrive, when you will need to *Wait* until the pub opens in Turn 140).

As soon as you can, go W, W, NE into the Public Bar, and you'll hear the phone – that you noticed earlier – ringing. *Answer phone* and you will be told to meet someone in the Snooker Hall – so go S, E, NE, W and W. When you arrive, Mr. Video will be waiting for you and he'll ask you if you are planning a job. *Say yes* and he will then tell you that there are others who are interested as well and they will meet you in the alley later.

Make your way E, E, SW and N to the police station, and note that it should now be Saturday afternoon (Turn 150). *Read poster* to get details about Mr. Video and then go S, SW and N to a service station.

Examine Station will reveal some tools, so enter *Take cutters* and go S twice to the pet shop.

There *Examine food* and then *Take pills*, so that you are now equipped to deal with the wire fence and the guard dog. Your final act should be *Read poster* to learn about Little Ken.

Next moves are N, NE, SE, S, and NE so that you can *Take pickaxe* and then continue SW, SW, SE and SW to the alley full of bottles, cartons and other rubbish. Enter *T* to check your number of turns and *Wait* until Turn 185, when the rest of the gang arrive.

Save here, just in case, and then choose the members of your gang by entering *Say Soapy, Say Mr. Video, Say Tricks.* These now join you, and you will be instructed to save your position and be told that the password for Part Two is *VERT ETEP.*

(Continued next month)

Upwardly mobile at college

THERE are some 30 puzzles to be solved in **Oxbridge** and the first involves escaping from the tower by getting and making use of the key to the back door. Up twice from the opening location brings you to the ladder. Take it, go back down again then West and take the marmalade.

Go back east and Down *three* times now into the cellar and take the key. Drop the ladder here and climb it up out of the cellar, go West twice and take the (metal detector) mop. Move E then S and enter:

```
OPEN DOOR WITH KEY
```

and there you are, free at last.

Moving S, W, and W takes you to the vicinity of the bees, which will sting you to death unless you distract them by dropping the marmalade. Once the bees are safely occupied you can collect the royal jelly and move to safety.

From the bees go NE, E, S, S, S, S and take the net before heading SW, S, SE to find and take the picklock. Now proceed E, catch the butterfly with the net, and continue NE, N, NW, W, NW, N, N, N, N, N, W to the Trophy Room. Drop the butterfly, net, jelly and key here and save: You should have six points.

If you now move E and N you come to the front door which can be opened with the picklock.

Continue N, N, W, W, W, W and S to find and take the pole ready for some punting.

Ordinary direction moves operate the punt, so the the full sequence is as follows: N, E, E, E, E, S, S, S, S, S, S, S, S, S, NE, S, E, SE, S, SW, N, N and N. Heeding the writing on the wall, SAY COURAGE to the pub troll to get the EXEAT hint and a tankard of beer.

Drinking the tankard enables something to drop to the ground – a coin – which you

Hatter's Helpline

I have just had a slap on the wrist from Oliver Bowman: I left something out when giving advice on how to leave the hospital safely in **Corruption.** I omitted to tell you to drop the stethescope as well as the clothes while lying on the bed.

This is how Oliver tackles the problem: Wait till the nurses go out of the ward, then LEAVE BED, TAKE PAPERS and go S, S, OPEN LOCKER, TAKE CLOTHES AND STETHESCOPE and go N then E.

WAIT till you hear the second set of footsteps, WAIT again then go W twice. TAKE BANDAGE, WEAR BANDAGE AROUND HEAD then LIE ON BED, DROP TIE, SHIRT, JACKET, TROUSERS AND STETHESCOPE.

After that it's just a question of hanging around till the nurse comes to put you in the ambulance, donning the suit and removing the bandage. When the ambulance stops at the traffic lights hop out and carry on sleuthing.

David Shepherdson has winged his way to the rescue of K. Williams who was stuck in **Temple of Terror**. The solution is a prehistoric Green one: Do NOT kill the Harpy. Then when you ride off into the wide blue yonder on the back of the eagle Pterodactyl and Harpy will dispute possession of the airspace and leave you in peace.

I've had a nice letter from Daniel Doran offering a complete solution to Superior's **Exile**. There's only one problem: I don't really deal with arcade adventures, since my colleague Hac Man came on the scene.

I know it's a moot point, but when we divided up the work, we felt he was better qualified to handle that sort of thing. The only arcade game I deal with is **Elite** and that's as a consequence of my own interest and anjoyment.

can now take. Whatever you do remember to drop the tankard, since attempting to carry it out of the pub was in last month's list of fatal mistakes to avoid.

Go S and W to where you can catch the crab safely – which is more than you can do from the punt – then continue N, E, S, S, S, E, NE, N, NW, N, W, NW, and N to the shovel. Take it and move four times North and then West to the Trophy Room.

Drop the picklock, pole, crab, coin and shovel and save once more. Your score is now doubled to 12 points.

(More next month)

Elite Scene

Remember R.J. Bevan's screen display problems with **Elite** which I mentioned in the March issue? Well, I've since heard from Ian Edwards – who has a tape copy of the game – and Ian had similar trouble.

He sent the tape back to Superior with an explanation and a SAE and got a fault-free replacement version. So it seems it really *is* a software and not a hardware problem.

A puzzled N. Thompson has a recent disc version, he's ELITE, and yet seems to be missing out on certain things. He regularly encounters the ships on the tape version plus Fer-de-Lances, Kraits and Shuttles – he's even encountered Transporters, but has had no sight of Asps, Anacondas, Boas and the like, and as for Thargoids – well, since the Second Mission, they've been nonexistent.

He also says that pressing CTRL+X while paused doesn't dump him into Witch Space. Admittedly this doesn't happen every time, but it all seems rather odd. Ships are randomly generated, so the odds against this sort of thing must be phenomenal.

His hardware includes Watford DFS 1.43 and their Transferom. Does any reader with both these and **Elite** have any helpful comment to make?

Dominic Muston – a Deadly Fugitive – has the Master version and says that he's come across a new ship. A cross between a Cobra and a Thargoid, the ship also released babies. Thinking the babies might be Alien Items, Dominic tried to scoop one up: Seriously depleted energy banks convinced him they weren't.

He tried launching a missile and was met with the ECM effect, but a second missile did the trick. I checked the date of Dominic's letter and it wasn't April 1st.

A couple of readers have queries about different aspects of **Elite**: A. Whitworth wonders if there is any way of surviving Thargoid attacks other than destroying the Mother Ship.

Well there's always the energy bomb or escape capsule – but since he encountered them while still Harmless, the probable answer is that nothing will save him until he has sufficient credits to get a military laser.

Thargoids are big, mean and fast. Regular saving is the best anti-Thargoid device while you lack combat experience.

Paul (Dangerous) Duffill did what I expect many players have done: He got news of the Second Mission, pressed his spacebar, and promptly forgot what planet he was told to go to.

Well, if you have qualified for the mission while in Galaxy Two and then move to Galaxy Three, you should emerge in the locality of Xeinis. It is after you've landed there – or somewhere safer – that you will be given instructions to go to Ceerdi.

So if Paul heads there, he should get cracking on the actual mission. Once he has completed it, he'll get a naval energy unit. An important tip here is to save his status with the naval unit, and keep the file separate. If he gets damaged in combat and loses the naval unit, then buys a replacement in a fit of absent-mindedness, he'll soon find he's back with an ordinary energy unit.

Paul asks if the extra goodies found on 16 bit versions of **Elite** – retro rockets, cloaking device and ID system are available to players on BBC versions. The short answer is *No*, but we do still seem to be discovering hidden depths in our own version, so there's no need to get jealous.

Paul's final comment sent me on a rather long – and expensive – voyage. He innocently asked if there was any substance to the rumour accessed by pressing f6 at Arredi in Galaxy 3.

It just so happened that the only saved Commander I had available to investigate was in Galaxy 4. So I plodded around the universe at vast cost, struggled my way to Arredi making many baddies bite the dust as I did so, and what did I find when I got there?

A message saying: *Coming soon, Elite II.* Since he has a BBC Master 128, and I have a 6502 2nd processor, that's exactly the version we have both been playing. The message was clearly a hangover from the first issue of **Elite**.

However, what this does remind us all is to press f6 once we have docked to see if the *Data on System* message has been altered. Who knows, there may be all sorts of interstellar graffiti left lying around by Messrs Bell and Braben.

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Red moon rising

Stuart Hatch discusses the best time to cast an eye on the sky

PREDICTING eclipses has pre-occupied man for thousands of years – and before the advent of modern mathematics and a realistic picture of how the solar system works, calculation was based on trends requiring recording data over very long periods. But now, with the help of your BBC Micro you can make the calculations in minutes.

There are two types of eclipses: Solar, when the Moon goes in front of the Sun, and Lunar which occurs when the Earth gets between the Sun and the Moon. Lunar eclipses are more common and these are predicted by the program given here. Such eclipses can only occur at the full moon, so we need only check around that time.

The Earth casts a shadow which is composed of two parts: A completely black section called the umbra and a partial shadow called the penumbra. From these two words you get the two types of Lunar Eclipse – umbral and penumbral. Only an umbral eclipse is worth watching – a penumbral isn't visible.

Type in the listing, ensure it's correct using the checksums, then save it. Because of the size of the program and the fact it uses Mode 1 it must be loaded at &1200 to run successfully. This only applies to Models B and B+ with PAGE set higher than &1200 – all other machines can just run it.

First you input the year – try 1990 first. The screen clears and you're presented with the *Searching...* message. After a few moments you are informed that one has been found and you can note down the details if you wish – the first one should be February 9, 1990 with the accompanying times 17:22, 19:06 and 20:41.

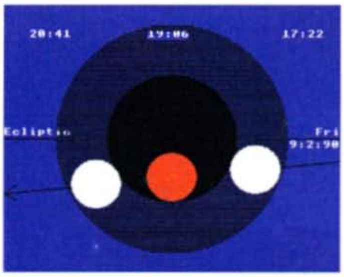
When you press a key the screen clears and a drawing representing three positions is given – the time the Moon enters the umbra, the time when it is at the centre and the time of leaving. For penumbral eclipses only one time is shown.

If the times shown – all of which are GMT – appear during our night the eclipse will be visible, clouds permitting. Ones that occur during midday can be seen from the Antipodes.

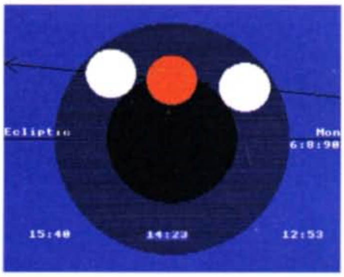
When a full lunar eclipse is in progress the Moon is still visible but it turns red. This effect is caused by light from the sun being reflected through the atmosphere and curved round to hit the Moon.

```
   10 REM Lunar Eclipse Finder
   20 REM by Stuart Hatch
   30 REM (c) The Micro User
   40 MODE7:VDU14:VDU23;8202;0;0;0;:FOR
C%=0 TO 1:PRINTTAB(7,C%)CHR$141CHR$131"L
unar Eclipse Finder":NEXT:DIM month$(12)
,day$(6):FOR C%=1 TO 12:READ month$(C%):
NEXT:FOR C%=0 TO 6:READ day$(C%):NEXT
   50 DATA January,February,March,April,
May,June,July,August,September,October,N
ovember,December,Sun,Mon,Tue,Wed,Thu,Fri
,Sat
   60 REPEAT:PRINTTAB(11,8)"Which year?
":INPUTTAB(23,8)""Y%:Y$=STR$(Y%)
   70 MODE1:PRINT''"Searching.....";:M%=
1:D=1:PROC_days
   80 REPEAT:PROC_FIND:UNTIL y%=Y%+1:*FX
21
   90 MODE7:PRINT'''"No more lunar eclip
ses in ";Y$''"<Q> to quit, any other key
 for more";:g%=GET OR 32:UNTIL g%=113
  100 CLS:END
  110 :
  120 DEFPROC_days
  130 m%=M%:y%=Y%
```

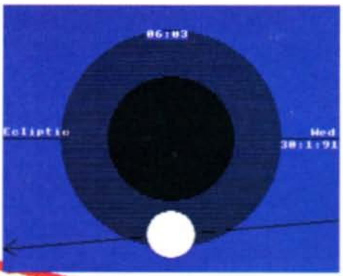
➤



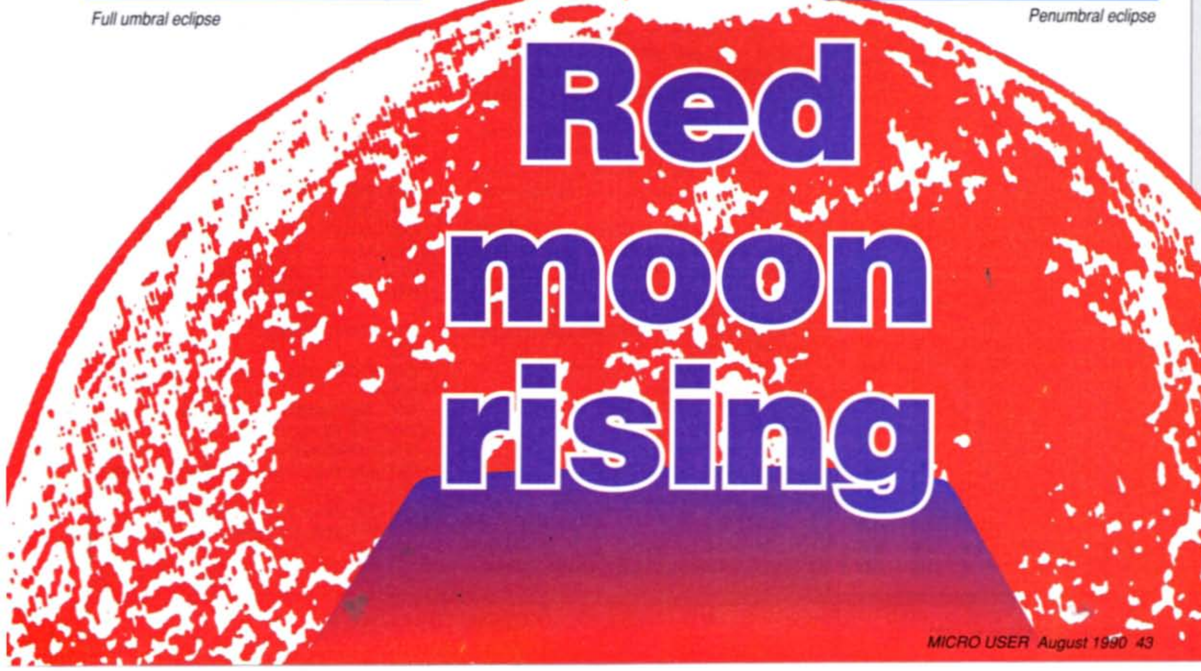
Full umbral eclipse



Partial umbral eclipse



Penumbral eclipse



➤

```
  140 IF m%=1 OR m%=2 THEN y%=y%-1:m%=m%
+12
  150 A%=y% DIV 100:B%=2-A%+A% DIV 4:C%=
INT(y%*365.25):DD%=INT(30.6001*(m%+1)):D
AYS=B%+C%+DD%+D-723244
  160 ENDPROC
  170 :
  180 DEFPROC_FIND
  190 PROC_SUN:PROC_MOON:difference=LAMB
DASUN-LAMBDAMOON:check=ABS(difference):I
F check<PI/2 THEN PROC_date:DAYS=DAYS+15
:ENDPROC:ELSE PROC_FULL
  200 DAYS=DAYS+30
  210 ENDPROC
  220 :
  230 DEFPROC_SUN
  240 N=(DAYS/365.2422)*2*PI:N=FN_rt(N):
M=N-.065674349:IF M<=0 THEN M=M+2*PI
  250 E=FN_Kepler(M):LAMBDASUN=E+4.93223
7687:LAMBDASUN=FN_rt(LAMBDASUN)
  260 ENDPROC
  270 :
  280 DEFPROC_MOON
  290 l=1.13403578+DAYS*.2299715042:l=FN
_rt(l):Mm=l-.0019443683*DAYS-6.0978848:M
m=FN_rt(Mm):EN=2.652035286-.00092422*DAY
S:EN=FN_rt(EN):Ev=.0222337493*SIN(2*(l-L
AMBDASUN)-Mm):Ae=.0032428218*SIN(M):A3=.
0064577182*SIN(M):Mtickm=Mm+Ev-Ae-A3
  300 Ec=.1097567753*SIN(Mtickm):A4=.003
7350046*SIN(2*Mtickm):ltick=l+Ev+Ec-Ae+A
4:V=.0114895025*SIN(2*(ltick-LAMBDASUN))
:ldoubletick=ltick+V:ENtick=EN-.00279252
68*SIN(M):y=SIN(ldoubletick-ENtick)*.995
970321:x=COS(ldoubletick-ENtick)
  310 tan=ATN(y/x):tan=FN_rtquad(tan):LA
MBDAMOON=ENtick+tan:LAMBDAMOON=FN_rt(LAM
BDAMOON):BETAMOON=ASN(SIN(ldoubletick-EN
tick)*.089683442)
  320 ENDPROC
  330 :
  340 DEFFN_rt(angle)
  350 IF angle<0 THEN angle=INT(ABS(angl
e)/2*PI)*2*PI+angle+2*PI
  360 =2*PI*(angle/(2*PI)-INT(angle/(2*P
I)))
  370 :
  380 DEFFN_Kepler(ANGLE)
  390 kl=ANGLE:REPEAT:delta=kl-.016718*S
IN(kl)-ANGLE:correction=delta/(1-.016718
*COSkl):kl=kl-correction:UNTIL ABS(delta
)<=.00000001
  400 =2*ATN(TAN(kl/2)*1.016860112)
  410 :
  420 DEFFN_rtquad(tan)
  430 IF y>=0 AND x>=0 THEN =tan
  440 IF x<0 THEN =tan+PI
  450 IF y<0 AND x>0 THEN =tan+2*PI
  460 :
  470 DEFPROC_date
  480 DAYSS=DAYS+2444238.5:A=INT((DAYSS+
1.5)MOD7+.5):I%=INT(DAYSS+.5):F%=DAYSS+.
5-INT(DAYSS+.5):IF I%>2299160 THEN A%=IN
T((I%-1867216.25)/36524.25):ELSE A%=I%
  490 B%=I%+1+A%-INT(A%/4):C%=B%+1524:D%
=INT((C%-122.1)/365.25):E%=INT(365.25*D%
):G%=INT((C%-E%)/30.6001):d%=C%-E%+F%-IN
T(30.6001*G%):dd%=INT(d%):hrs=DAYS-INT(D
AYS):hr=INT(24*hrs):min=INT(60*(24*hrs-h
r))
  500 IF G%<13.5 THEN m%=G%-1:ELSE m%=G%
-13
  510 IF m%>2.5 THEN y%=D%-4716:ELSE y%=
D%-4715
  520 min$=STR$(min):IF LEN(min$)<2 min$
="0"+min$
  530 hr$=STR$(hr):IF LEN(hr$)<2 hr$="0"
+hr$
  540 date$=STR$(dd%):month$=month$(m%):
year$=STR$(y%)
  550 digit$=RIGHT$(date$,1):IF digit$="
1" suffix$="st" ELSEIF digit$="2" suffix
$="nd" ELSEIF digit$="3" suffix$="rd" EL
SE suffix$="th"
  560 IF LEFT$(date$,1)="1" AND LEN(date
$)<>1 suffix$="th"
  570 ENDPROC
  580 :
  590 DEFPROC_FULL
  600 REPEAT:catchup=8.8837259E-3+1.0471
976E-3*COS(Mtickm):IF LAMBDASUN<PI THEN
difference=difference+PI ELSE difference
=difference-PI
  610 IF ABS(difference)>PI AND SGN(diff
erence)=-1 THEN difference=2*PI+differen
ce
  620 DAYS=DAYS+(difference/(24*catchup)
):PROC_SUN:PROC_MOON:difference=LAMBDASU
N-LAMBDAMOON
  630 UNTIL ABS(ABS(difference)-PI)<0.00
005:PROC_date
  640 rhotick=.99698599/(1+.0549*COS(Mti
ckm+Ec)):pi=.016592845/rhotick
  650 deltalambda=.009599311+.0010471975
5*COS(Mtickm):deltabeta=8.726646E-4*COS(
ldoubletick-ENtick)
  660 Su=pi-.00471238898:Sp=pi+.00471238
898:thetam=.009042551/rhotick:rate=delta
lambda-7.16783E-4:factor=1280/7/rate
  670 IF ABS(.995970321*BETAMOON)<(theta
m/2+Su) THEN PROC_um ELSEIF ABS(.9959703
21*BETAMOON)<(thetam/2+Sp) THEN PROC_pen
  680 ENDPROC
  690 :
  700 DEFPROC_um
  710 VDU7:a=1+deltabeta^2/rate^2:b=2*BE
TAMOON*deltabeta/rate:H=(Su+thetam/2)^2:
c=BETAMOON^2-H
  720 root=b^2-4*a*c:X2=(-b+SQR(root))/(
2*a):X1=(-b-SQR(root))/(2*a):IF SGN(X2)=
-1 X=X1:X1=X2:X2=X
  730 starthrs=X1/rate:endhrs=X2/rate:mi
d=24*hrs:starttime$=FN_DDtoDM(mid+starth
rs):endtime$=FN_DDtoDM(mid+endhrs):mid$=
hr$+":"+min$+" GMT"
  740 CLS:CLG:VDU20:PRINT"Eclipse partic
ulars are:"''TAB(5)"Date: ";date$;suffix
$;" ";month$;" ";year$''
  750 PRINTTAB(5)"Eclipse begins: ";star
ttime$'TAB(5)"Mid-eclipse:    ";mid$;'TA
B(5)"Eclipse ends:   ";endtime$
  760 pen%=FALSE:PROC_diagram
  770 ENDPROC
  780 :
  790 DEFPROC_pen
  800 VDU7:mid=24*hrs:mid$=hr$+":"+min$+
" GMT":CLS:CLG:VDU20
  810 PRINT'''"This is a penumbral eclip
se:"''TAB(5)"Date: ";date$;suffix$;" ";m
onth$;" ";year$''TAB(5)"Mid-eclipse:
";mid$;
  820 pen%=TRUE:PROC_diagram
  830 ENDPROC
  840 :
  850 DEFPROC_diagram
  860 *FX21
  870 PRINT'''"Any key for the diagram";
:G%=GET:VDU19,2,4,0,0,0:COLOUR130:GCOL0,
0
  880 CLS:MOVE0,512:DRAW1280,512
  890 r=Su*factor:PROC_circle(640,512,r,
4):r=Sp*factor:PROC_circle(640,512,r,8):
GCOL0,3
  900 VDU5:MOVE0,550:PRINT"Ecliptic":dat
a$=date$+":"+STR$m%+":"+RIGHT$(year$,2):
MOVE1279-(32*LENdata$-3)/2+3,550:PRINTda
y$(A):MOVE1279-32*LENdata$,500:PRINTdata
$:VDU4
  910 GCOL0,0:lh=(3.5*deltabeta+BETAMOON
)*factor+512:MOVE0,lh:DRAW1280,(BETAMOON
-3.5*deltabeta)*factor+512:MOVE0,lh:DRAW
50,(3.225*deltabeta+BETAMOON)*factor+542
:MOVE0,lh:DRAW50,(BETAMOON+3.225*deltabe
ta)*factor+482
  920 GCOL0,3:r=thetam/2*factor
  930 IF pen%=FALSE PROC_circle(640-X1*f
actor,(BETAMOON+starthrs*deltabeta)*fact
or+512,r,4):PRINTTAB(33,15+12*SGN(BETAMO
ON))LEFT$(starttime$,5)
  940 IF pen% GCOL0,3:COLOUR3 ELSE GCOL0
,1:COLOUR1
  950 y=BETAMOON*factor+512:PROC_circle(
640,y,r,4):GCOL0,3:COLOUR3:PRINTTAB(17,1
5+12*SGN(BETAMOON))LEFT$(mid$,5)
  960 IF pen%=FALSE PROC_circle(640-X2*f
actor,(BETAMOON+endhrs*deltabeta)*factor
+512,r,4):PRINTTAB(3,15+12*SGN(BETAMOON)
)LEFT$(endtime$,5)
  970 *FX21
  980 PRINTTAB(10,31 AND SGN(BETAMOON)=1
)"Any key to continue...";:g%=GET:PRINTT
AB(10,31 AND SGN(BETAMOON)=1)"Search res
umed........";
  990 ENDPROC
 1000 :
 1010 DEFFN_DDtoDM(time)
 1020 LOCAL hrs,hrs$,mins,mins$
 1030 hrs=INT(time):hrs$=STR$(hrs):IF LE
N(hrs$)<2 hrs$="0"+hrs$
 1040 mins=INT((time-hrs)*60+.5):mins$=S
TR$(mins):IF LEN(mins$)<2 mins$="0"+mins
$
 1050 =hrs$+":"+mins$+" GMT"
 1060 :
 1070 DEFPROC_circle(ox,oy,radius,U%):LO
CAL x,y
 1080  MOVE ox-radius,oy:DRAW ox+radius,
oy:FOR y=0 TO radius STEP U%
 1090 x=SQR((radius+y)*(radius-y))
 1100 oxpx=ox+x:oxmx=ox-x:oypy=oy+y:oymy
=oy-y
 1110 MOVE oxmx,oypy:DRAW oxpx,oypy
 1120 MOVE oxmx,oymy:DRAW oxpx,oymy
 1130 NEXT
 1140 ENDPROC
```

Get it right ✓

```
  10 =    0 0    300 = 6915 4
  20 =    0 0    310 = 8532 B    590 = FC81 6    870 = E831 9
  30 =    0 0    320 = ED0F F    600 = D981 1    880 = 9C15 2
  40 = C934 4    330 = 9719 D    610 = 8A70 E    890 = 2F67 6
  50 = 8A80 D    340 = D339 2    620 = 8418 9    900 = B324 7
  60 = 19F3 5    350 = 639D 1    630 = BA9A 9    910 = FF08 5
  70 = 6A76 C    360 = 1198 8    640 = 3A13 E    920 = B98C 0
  80 = 4DD8 C    370 = 9719 0    650 = 8002 4    930 = C7ED 3
  90 = 4F4A 1    380 = 2243 A    660 = C15E 4    940 = 8C4E 5
 100 = 8215 5    390 = F01E 0    670 = B10B 8    950 = F695 5
 110 = 9719 D    400 = 956B 5    680 = ED0F 9    960 = 7E34 7
 120 =  21E 0    410 = 9719 0    690 = 9719 7    970 = B5F5 8
 130 = F3ED 7    420 = 833A D    700 = 5CE5 D    980 = FB9E 0
 140 = F31F A    430 = 66DA F    710 = 2F27 A    990 = ED0F F
 150 = AC60 F    440 = 630B E    720 = 2806 A   1000 = 9719 E
 160 = ED0F D    450 = 72B1 B    730 = 3924 7   1010 = 1FE1 F
 170 = 9719 6    460 = 9719 9    740 =   A5 1   1020 = 22D0 0
 180 = 2DE9 0    470 =  6B5 1    750 = AAC2 F   1030 = E087 6
 190 = 7A52 2    480 = EE4F C    760 = 53B2 8   1040 = 30F8 8
 200 = CEC0 D    490 = 6211 D    770 = ED0F 8   1050 = 2765 3
 210 = ED0F 8    500 = F614 A    780 = 9719 7   1060 = 9719 F
 220 = 9719 D    510 = 3494 7    790 = 9148 2   1070 = C774 E
 230 = 6F29 C    520 = 8BB3 6    800 = 89C6 F   1080 = 1355 D
 240 = AB6F 9    530 = 3569 1    810 = 7385 3   1090 = E76C E
 250 = DF8B A    540 = 836B F    820 =  4B2 B   1100 = 5194 5
 260 = ED0F 7    550 = 7E70 E    830 = ED0F F   1110 = A42F E
 270 = 9719 4    560 = ADA9 3    840 = 9719 1   1120 = 7A58 A
 280 = 132D 6    570 = ED0F 3    850 = A707 6   1130 = 2C83 E
 290 = 3E0B 8    580 = 9719 8    860 = B5F5 B   1140 = ED0F 3
```

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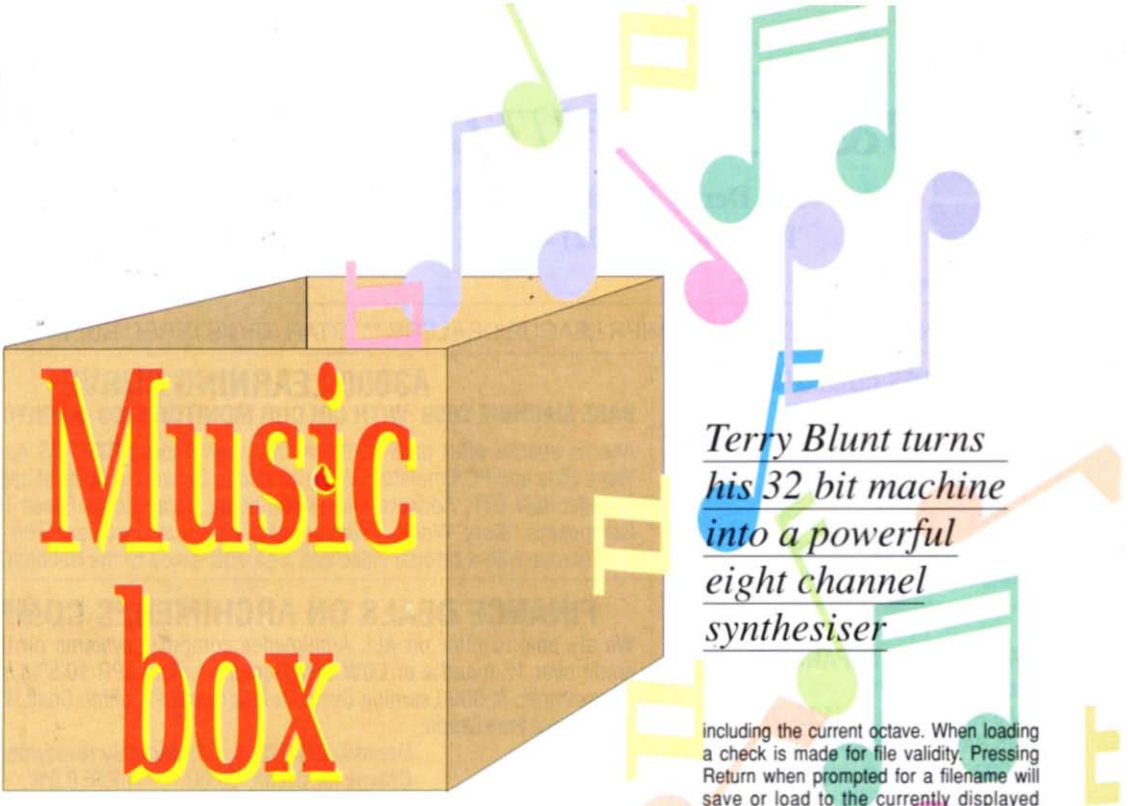


Music box

Terry Blunt turns his 32 bit machine into a powerful eight channel synthesiser

CONTROLLING the powerful sound capabilities of the Archimedes series or BBC A3000 is quite a task. But here's an easy way to turn your Archimedes into a polyphonic synthesiser and sound editor. It's called KeySound.

What you get with this program is the ability to design up to 12 sounds with volume and pitch control plus some special effects. You can load and save them individually or save a relocatable voice module containing any or all or the voices you've created, so you can then use them in other programs such as !Maestro.

To get going type in the listing – it's not multitasking – use the checksums to ensure you've made no typing errors and save it.

When you run the program there is a short delay while the machine code is assembled, some mathematical tables are calculated and the 12 default voices are compiled. You are then presented with the main display and are immediately in the editing mode.

Making music

Clicking on *Play* will clear the other options and display your synthesiser keyboard. Two sets of keys are used, laid out piano style. The on-screen keyboard shows white for the white notes and red for black ones. The line ZXCVB has the letter Z as middle C and the line QWERTY uses R as C one octave above middle C.

Up to eight notes will sound at any time; if a ninth note is pressed the oldest one is lost. Pressing several keys at the same time won't always work as the negative inkey system can become confused.

You can step up and down octaves with the up and down cursor keys. Octave settings are -8, 0, 8. The change is instantaneous so you don't need to interrupt your playing. Function keys 1 to 12 will change voices and does it reasonably quickly too.

Pressing Escape returns you to edit mode. All cyan-coloured parts of the display are responsive to the mouse by dragging or clicking with Select. Generally, yellow is used for information and green for outline limits, while white indicates values that can be altered.

Clicking Select over any of the twelve listed voice names duplicates the function key action. This not only selects voices for playing but also for loading, saving and renaming. The default voices are given in Table I.

Clicking Adjust on a voice box toggles it between enabled or disabled. Disabled voices are not selectable when playing and will not be included when you save a sound module. You can't disable the currently selected voice.

An individual voice can be saved by selecting it as the current voice and clicking on Save. Or you can load a previously saved one using Load. Prompts are given and the file name is the displayed voice name. Saving and loading is to the currently selected voice.

Saving a voice stores all its parameters, including the current octave. When loading a check is made for file validity. Pressing Return when prompted for a filename will save or load to the currently displayed name. Clicking on Rename changes the name of the current voice without altering any of its parameters.

The Module option prompts for a filename in the same way as save and load, and then creates a relocatable module of all the currently enabled voices. Therefore a library of 1 to 12 different voices can be assembled in one file. This can then be loaded and used in !Maestro or any other sound program.

Bell	HammondOrg	Ethereal
Saw	Vibraphone	ChurchOrg
Harpsicord	Flute	Horn
PipeOrg	BlockSynth	Fantasy

Table I: The default voices

Changing voices

Editing the current voice is done simply by moving the mouse to the appropriate part of the display and clicking or dragging on the cyan parts.

When dragging envelope shape markers some of the white envelope outlines may go outside their frames. This does no harm but may give unpredictable results. Similarly the harmonic content can be set too high, which is easily identified by sharply re-entrant spikes in the waveshape and a sudden harshening of the sound.

The timbre is altered by summing sine waves using the fundamental frequency and its main harmonics f1-f9. Random noise is added with f0 to give wind-type sounds.

The amplitude envelope has three variable nodes, attack, decay and sustain, all of which can be changed vertically in amplitude and horizontally in time. Tremelo depth and speed modify the sustain phase only.

It isn't usually possible to get zero tremelo amplitude, due to the way the sustain is created in chunks, however setting a very fast tremelo time will tend to smooth out the steps. Careful selection of repeat time in conjunction with attack amplitude can be used to get almost continuous

smooth sound. The frequency envelope has a further three nodes, head, mid and tail. Head and tail can only be altered vertically by frequency deviation, whereas mid can be altered horizontally in time as well. Vibrato depth and speed only modify the tail phase.

How it works

If you decide to play around with parts of the program it is important to remember that the exit routines in PROCtidy and PROCerror are essential. And the new sound tables, along with their handling code, are all in normal user ram and the system will crash most resoundingly if any attempt is made to overwrite this workspace.

The heart of the program is the machine code used to replace the normal 32 bit sound system. This is based largely on information and code examples in the Programmers Reference Manual.

For each voice a table is created of instantaneous voltages. This is then scanned to produce a continuous complex wave, the frequency (pitch) of which is determined by the scan speed.

Further tables are created to control the amplitude envelope of the wave produced by modifying the interpretation of the instantaneous values, and the pitch envelope is developed by varying the scan rate.

These tables are embedded in the code itself and although modules that don't use the official method of allocating workspace are frowned upon, this is acceptable as sound modules can't be used in rom form anyway.

Sine values are needed to re-calculate the harmonic content of a voice when it has been loaded or edited. Rather than obtain these directly, the array *Sine%()* is filled with a table of sine values in PROCinit. This makes for a dramatic increase in speed.

The array *par%()* is used to store all the parameters of all the twelve function key voices. Although making it a bit difficult to follow the program, using a single two dimensional array like this for all parameters gives a rapid response to change of function key number and makes saving and loading much easier. The array element order is shown in Table II.

Play control is done by each successive call to PROCkey stepping the channel number so that all eight channels are employed before a call kills off an already sounding voice.

Use of a long line of IFs on negative INKEYs is, unfortunately the only satisfactory way of getting polyphonic response. A CASE statement, for example, would only allow the first matching line to give it's key response.

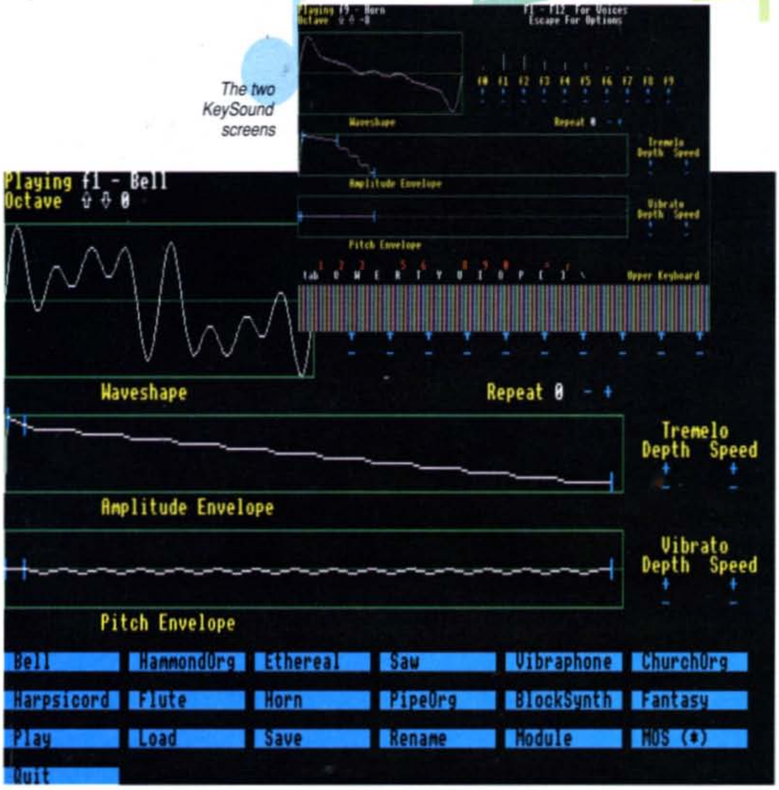
Mouse control is fairly conventional. Toggling between PROCmenu and PROCedit improves response time, helps to ensure that all parameters are updated as necessary, and eases the different types of calculation required for editing and menu selection.

0 = harmonics
1 = repeat
2 = attack
3 = decay
4 = sustain
5 = tremelo
6 = head
7 = mid
8 = tail
9 = vibrato
10 = octave

Table II: The parameter order in par%()

The code for the module header is re-assembled each time a module is to be saved. This is necessary as a different number of voices, may need to be saved each time. The code is such that it always produces the most compact module for the number of voices enabled.

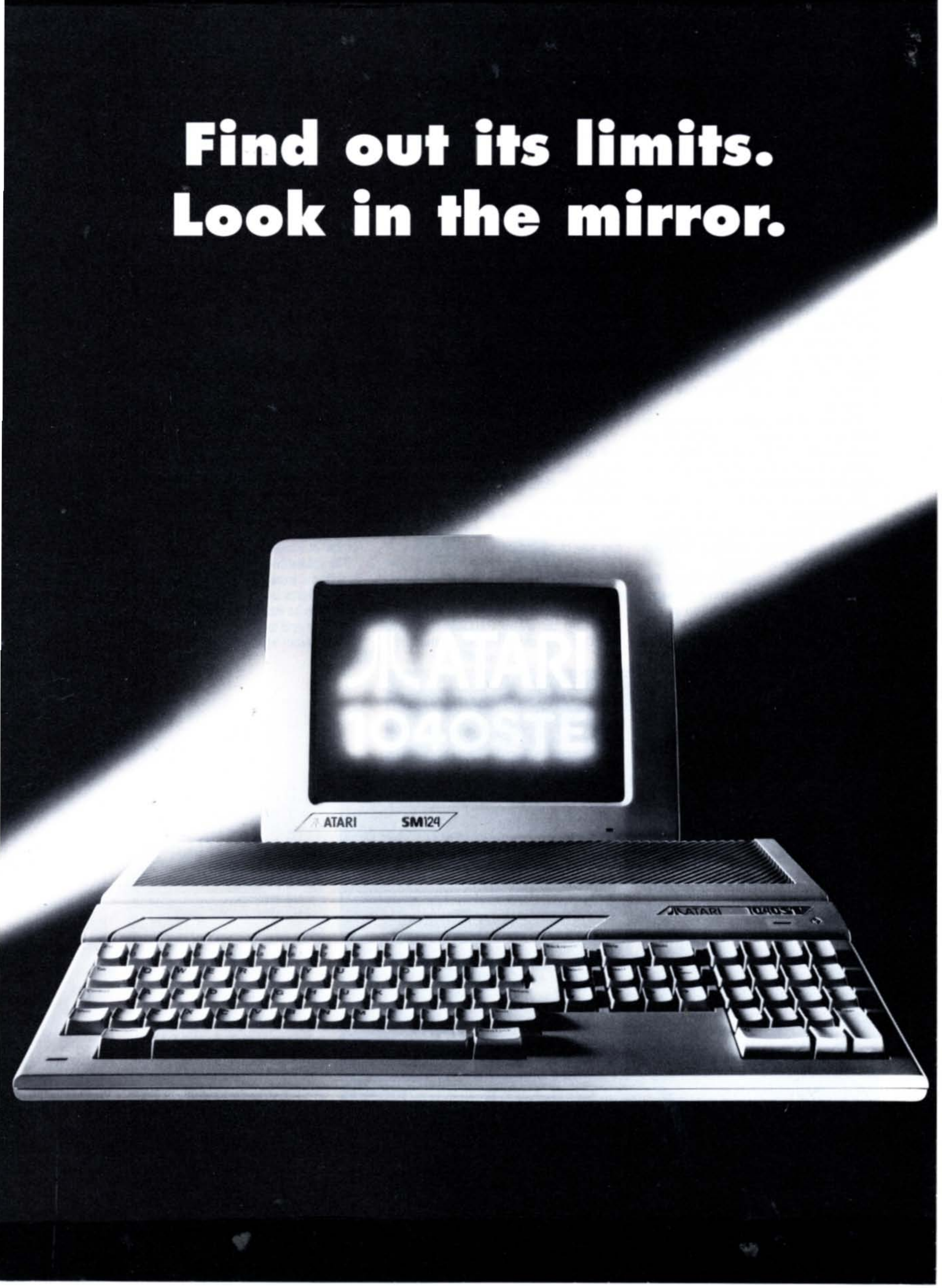
The voices themselves have a fixed size, so with the excellent position-independent characteristics of ARM code, the required voices can be individually picked out of the main code and tacked on to the end of the module header without alteration.


Playing f9 - Horn
Octave ⇧ ⇩ -0
F1 - F12 For Voices
Escape For Options
f0 f1 f2 f3 f4 f5 f6 f7 f8 f9
Waveshape
Repeat 0 - +
Tremelo
Depth Speed
Amplitude Envelope
Vibrato
Depth Speed
Pitch Envelope
tab Q W E R T Y U I O P [ ] \
Upper Keyboard
Playing f1 - Bell
Octave ⇧ ⇩ 0
Waveshape
Repeat 0 - +
Tremelo
Depth Speed
Amplitude Envelope
Vibrato
Depth Speed
Pitch Envelope
Bell
HammondOrg
Ethereal
Saw
Vibraphone
ChurchOrg
Harpsicord
Flute
Horn
PipeOrg
BlockSynth
Fantasy
Play
Load
Save
Rename
Module
MOS (*)
Quit

The two KeySound screens

```
 10 REM > KeySound
 20 REM   by Terry Blunt
 30 REM (c) The Micro User
 40 ON ERROR PROCerror
 50 PROCinit
 60 PROCassemble
 70 PROCchannels
 80 MODE 12
 90 PROChour(FALSE)
100 ON ERROR PROCerror
110 PROCdisplay
120 PROCmenu
130 PROCtidy
140 END
150 :
160 :
170 DEF PROCerror
180 VDU 4
190 PRINT REPORT$ " - Press
a key"
200 IF GET
210 IF NOT INKEY TRUE ENDPRO
C
220 ON ERROR OFF
230 *RMREINIT SoundDMA
240 *RMREINIT SoundChannels
250 *RMREINIT SoundScheduler
260 *RMREINIT WaveSynth
270 *RMREINIT StringLib
280 *RMREINIT Percussion
290 *FX 4
300 *FX 12
310 *FX 229
320 END
```

Turn to Page 110


Find out its limits.
Look in the mirror.
ATARI
1040STE
ATARI SM124
ATARI 1040STE

Introducing the powerful new Atari 1040 STE. With such an awesome machine, we're convinced the only limits you'll come across are your own.

Based on the incredibly successful 1040 STFM, the 1040 STE itself goes beyond the limits of its predecessor.

The 'E', by the way, stands for 'Enhanced'. But once you've discovered its amazing array of features, you may consider 'Enhanced' to be the understatement of the decade.

Perhaps the most outstanding feature of the 1040 STE is its graphics. Its palette contains over 4000 colours (all right, 4096 to be exact).

To ensure precise and realistic images, the STE features 'hardware scrolling', enabling smooth scrolling in any direction and split-screen effects. And, with the SM124 monitor, you'll get razor sharp black-out-of-white text that's as clear as the type on this page.

To complete the picture, it is able to 'phase-lock' its video output to an external video source, permitting direct linking to a Genlocking device.

The 1040 won't just have your eyes swivelling in their sockets. Your eardrums will also take a pounding from the 8-bit PCM stereo sound.

The new PCM (Pulse Coded Modulation) sound system's two chips allow the 1040 STE to replay high-quality sampled sounds, in stereo, without burdening the CPU. Or, for even more of an earblasting, just add a couple of RCA output jacks and power the sounds through your own stereo.

Of course we mustn't forget memory. One megabyte of RAM comes as standard. If that's not enough, the 1040 STE provides four SIMM sockets. Simply plug in some SIMM (Single In-line Memory Module) boards and boost the RAM up to four megabytes.

To help you handle all this technology, we've added even more: a Blitter chip, capable of shifting data at high speeds independent of the CPU, and a new version of TOS.

The TOS 1.6 (operating system) has an enhanced file selector with drive-change buttons, improved desktop with file move, MS-DOS compatible disk formatting, and better application installation and auto-booting facilities.

As you'd expect, there's a huge range of peripherals including hard disks, floppy disks, laser printers, colour monitors and even Megafile 44, Atari's unique 44-megabyte removable hard disk.

As well as all this hardware, there are hundreds of software programmes for the 1040 STE - we're even throwing in the ST-Series Productivity and Leisure bundles free.

The Productivity bundle features a database, spreadsheet, word processor and business graphics package, and there's S.T.A.C., FirST BASIC, Hyperpaint and Prince in the Leisure bundle.

If you're itching to get your hands on the controls, there are two 15-pin analogue controller ports (which accept paddles, light-guns and light-pens) and a 9 pin mouse port and joystick port.

With adaptors, up to six people can use the 1040 at one time. Just in case it's too much for one person to handle.

At £499.99 it certainly won't be too much for one person to afford.

The ideal computer at the ideal price, you may think. We think so, too. But there remains only one potential problem: not whether you'll make impossible demands of the 1040, but whether the 1040 will make impossible demands of you.

Please send me further details of the 1040 STE and other Atari products.

NAME: ______________________________

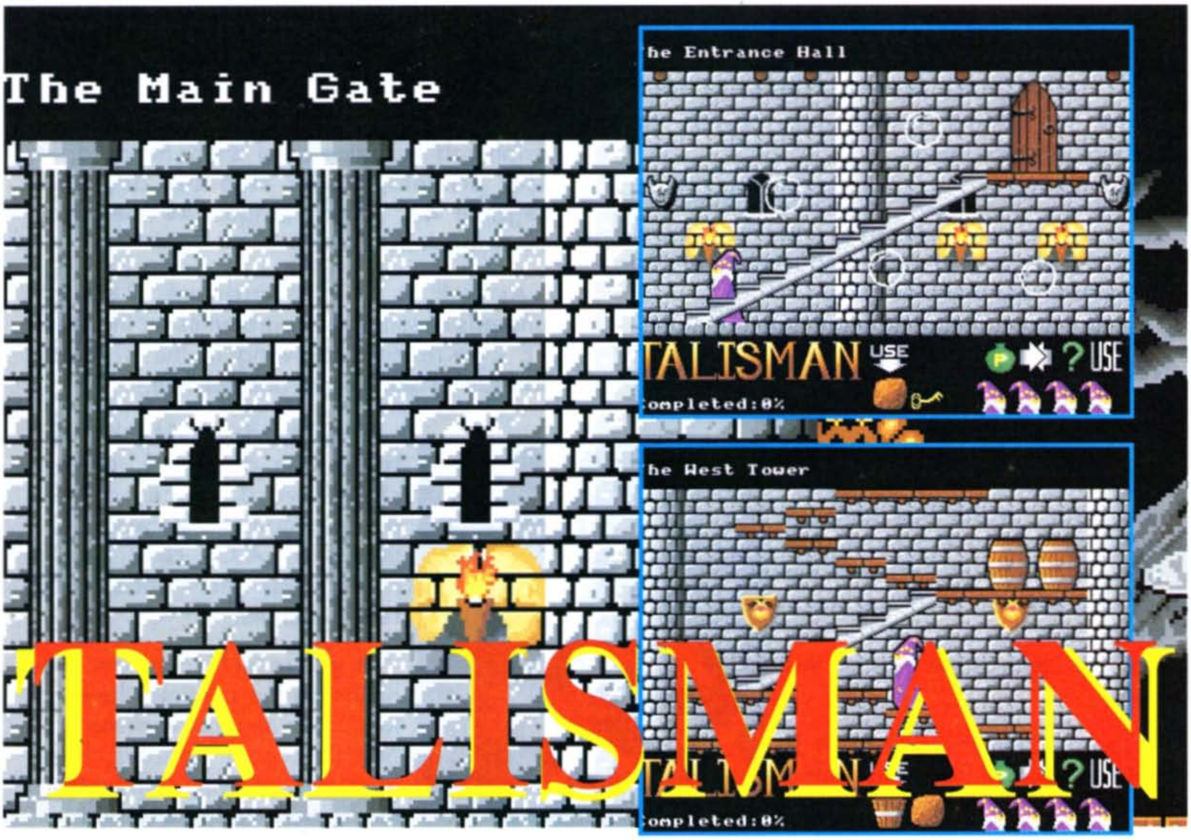
ADDRESS: ______________________________

______________________________ POSTCODE ________

Please send to Atari Corp (UK) Ltd. Atari House, Railway Terrace, Slough, Berkshire. SL2 5BZ.

ATARI 1040STE

WITHOUT IT YOU'RE JUST PLAYING GAMES



TALISMAN

. . . castle creepies don't disappoint

Price: £14.95
Supplier: Minerva, 69 Sidwell Street, Exeter EX4 6PH.
Tel: 0392 437756
Requirements: Archimedes series or BBC A3000

WHILE the packaging pictures don't do justice to their counterparts on the screen, at least they're more accurate than the story line. The box asserts that the evil wizard Zaldremon is responsible for the terrible state of affairs which has befallen the land, but the storyline on the screen has the culprit as a Baron. Perhaps he's both.

The program requires 400k, so before you double-click the head of the good wizard be sure that you've got enough; alternatively pressing Shift+Break will do the trick.

The mystical looking menu screen has a scrolling message passing along the lower portion. Try not to fall asleep before it ends as there is some important information there – you could end up thoroughly frustrated, stuck in a small area of the adventure.

The tutorial gives game play details and the keys to use. What a pity that the mouse could not be used to control the wizard's movements instead of the old A, Z, ', /, and spacebar – although you can redefine them.

The evil Baron has smashed the Talisman into six pieces and scattered them. Your task, as the remaining good wizard, is to recover them from around the kingdom, re-assembling them while fighting the forces of evil.

The screen backgrounds are beautiful, with castle walls of real stone, authentic-looking trees, flaming torches and fires – but why can't they scroll smoothly instead of flicking between screens?

The wizard's movements are unpredictable at times, although he makes a realistic ticking noise with his feet as he walks.

Talking of sound, the BBC A3000 has a wonderful system, but the wizard hardly knows it is there, producing only simple tones as he jumps or is attacked, and there's no background music to set the scene.

The ghouls, ghosts and monsters I came across were far better than just 8-bit derivatives and unlike the wizard, do justice to the machine – except for the bubbles which were little more than empty circles. There are bats, wasps, red beetles and all manner of unusual creatures out to sap your lifeblood.

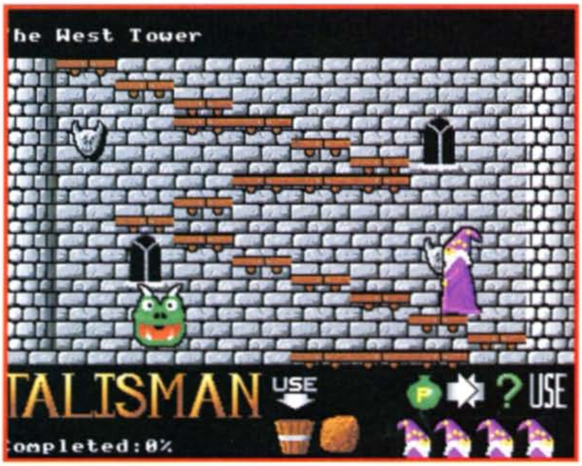
Initially, I didn't achieve more than two per cent of the game, being sapped of my energy by the monsters time and time again, before I could explore much of the castle or surrounding forests.

The secret is to read the scrolling screen message – you have been warned.

Initially I found Talisman disappointing, but once the play opens up it's a fascinating and well-produced arcade adventure, with excellent scenery and pretty good sprites. As the next step up from Citadel it can't be beaten – at least, not yet.

Baz Racon

Sound	*6*
Graphics	*9*
Playability	*8*
Value for money	*8*
Overall	*7*



Price: £29.95 (PC version)
Supplier: Activision, Blake House, Manor Farm Road, Reading, Berkshire RG2 0JN.
Tel: 0734 311666
Requirements: Archimedes or BBC A3000 and PC Emulator

What the butler saw?

LEISURE SUIT LARRY III

. . . tropical adventures

IT was 1987 when a superstar burst on the world. You may have missed his debut but the Archimedes' PC emulator gives you the ideal opportunity to make his acquaintance. Believe me when I say that Larry has become something of a legend. Born of the Reagan years and yuppie superiority, Larry Laffer is a phenomenon.

Firstly picture the archetypal medallion man. Add even more fake tan and some large teeth, then subtract tact, subtlety and care for your fellow human beings. You now have our hero. Progressing from his first appearance in Leisure Suit Larry in the Land of the Lounge Lizards to his adventures in Looking for Love, he is now living on the island of Nontoonyt.

Is this game crude, is it chauvinistic? You bet, but most of all it is very funny. And as an adventure it is challenging, interesting, graphic and humorous. If you have already played Larry I and II, you don't need converting to its merits.

As with all Sierra games, the packaging is detailed and informative – not to mention important if you wish to succeed. First, though, you have to deal with the protection. This is not to check that you've got a pukka copy, but that you are of an age to play.

Well, how many of you know what the Andy Griffith show is? Get that one right from the over 18 range, and you can play at the Pretty Dirty Level. Easier to access is the 25+ age group. The questions are risqué, and correct/witty answers will allow you to play the Rather Risqué Level. If your sensibilities are not up to this, you can make informed guesses on a lower level, get a lot wrong and still play the game.

Larry's designer Al Lowe got his inspiration while on holiday in Mexico. "Some of the things that happened – the mad rush to the airline ticket counter, a really terrible plane ride, a resort so heavily landscaped we kept getting lost... they all found their way into the game".

Leisure Suit Larry III reverts in some way to the original's line in bad taste. Larry is basically the same sort of guy, his surroundings the same type of kitsch, and of course he is searching for the girl of his dreams, self-esteem and adventure.

Nontoonyt is a jungle island and holiday paradise. In the packaging there's a postcard to send to your nearest and dearest. The guide to the island is packed with hints and ideas for your holiday delectation.

You begin your adventure – as do all good holidaymakers – on Vista Point. The view will take your breath away. Fortunately for you, some visitor or holiday official has left binoculars which will allow you to search the island in further detail. In fact there are two pairs, both with educational views.

As a true tourist you shouldn't miss a visit to the sumptuous home of that pillar of society Larry Laffer. As you would expect, Mr. and Mrs. Laffer (yes, the Prince of Lounge Lizards did marry Princess Kalalau Laffer) live surrounded by the highest security – you should just look at the walls.

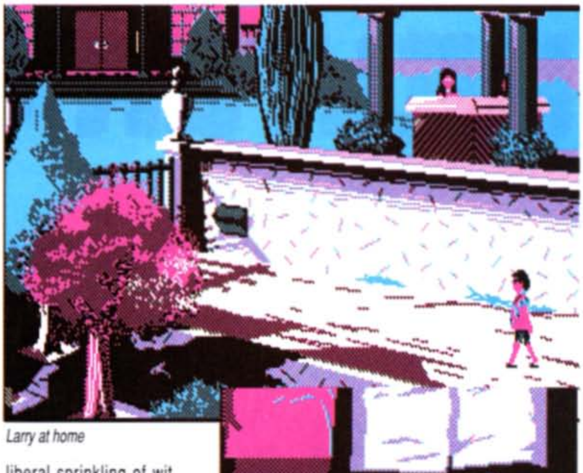
You won't get bored on the island, and with only one TV – and that in the middle of Walken Park – you'd better try some of the famous entertainments. If you can stand listening to Paul Paul at the Comedy Hut you may be rewarded, and the wood carving lessons on a Monday would be great if you had some of the famous granadilla wood.

What makes Larry III different is Patti. You can change role in mid-adventure and look at life and Larry with new eyes. Your female persona is looking for the one that got away, her perfect man. Larry is on the run from Patti, spies, mad scientists and the horror of another hour in Paul Paul's company.

The tongue-in-cheek stereotypes and liberal sprinkling of wit could not have been brought off without an excellent user interface, nice animation, tricky problems, puzzles and a totally complex and improbable plot.

Go on... treat yourself!

Jo Giles


Larry at home

Larry III: The opening screen

Sound	*5*
Graphics (PC EGA)	*6*
Playability	*8*
Value for money	*10*
Overall	*7*

INERTIA

. . . in a spin

A NEW idea in BBC Micro software? Well, not quite, there have been games like it in the past. Inertia, however, is vastly superior to earlier attempts on a similar theme.

The aim is simple. You steer your craft, a kind of spinning top, through a series of three dimensional landscapes, the surfaces of which are covered in tiles and you must collect the shaded ones.

The problem is that this world has edges and it is all too easy to lose control of your vehicle and land up in the nether regions. This involves the loss of a life.

At first the task seems fairly easy: The paths are wide and simple to negotiate. But after a few screens problems crop up.

Shaded tiles need to be collected from very narrow passages with no walls to prevent a disaster occurring.

At other points ramps send your vehicle spinning into space with only a hope that it will make a soft landing. It is fortunate that you are equipped with first rate brakes as well as controls to move you up, down, left and right.

These have to be used in tandem when diagonal movement is required. When you do have the misfortune to fall off the edge of the world you restart from the point where you last found a shaded tile.

When you feel you have mastered these basic problems other troubles will start to afflict you. Jump tiles throw the spinning top into the air.

With luck, you won't land on a direction square which reverses the operation of your control keys.

Ice is another hazard. This causes the craft to skid and it is essential to be heading in the correct direction before attempting to cross this slippery surface. Other tiles make the brakes fail or the steering defective. Again, great care is needed before these are crossed. One other interesting idea is the transformation tile. This alters your craft from a light, fast mover into a slow, lumbering but more controllable device. This is certainly an aide to crossing awkward surfaces.

Inertia is an arcade adventure with a difference. Players without superb memories will probably need to produce a map if they hope to find every shaded tile.

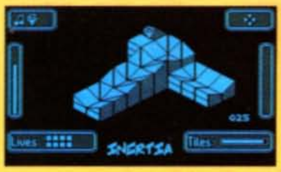
You start the quest with three lives, but an extra one is gained for each tile collected. This can easily build up to the maximum of 12, but they are lost all too easily while trying to set a straight course along an ice floe. Each tile also gains you five points while losing a life reduces your score by three.

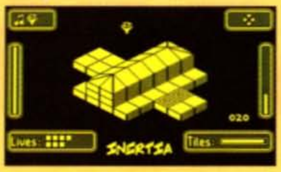
Price: £9.95
Supplier: The 4th Dimension, 1 Percy Street, Sheffield S3 8AU.
Tel: 0742 700661
Requirements: All 8 bit BBC Micros

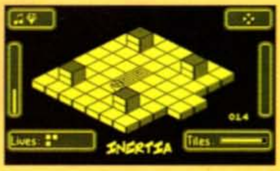
The graphics are very good. Mode 4 has been chosen which limits the screen to two colours, but rapid scrolling means that the colours change frequently.

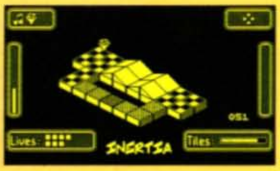
The craft can move swiftly – and it does so smoothly and without flicker.

The playing area is a window in the middle of the screen which is surrounded by neat status icons. Along the top of the









HELTER SKELTER

. . . bounce into action

Price: £9.95 (tape) £11.95 (disc)
Supplier: Audiogenic, Winchester House, Canning Road, Weeldstone, harrow HA3 7SJ..
Tel: 081-861 1166
Requirements: Electron, BBC, Master

IN these days of ever increasing sophistication it is most refreshing to play a game as simple yet addictive as Audiogenic's Helter Skelter. The storyline goes like this: The world has been overrun by herds of comical looking monsters and your mission is to bounce the little blighters into oblivion. I choose the word bounce specifically, since you are a red rubber sphere of considerable size.

Ball control is achieved by means of three keys – left, right and bounce and your mastery of the bounce button will determine the outcome of the game.

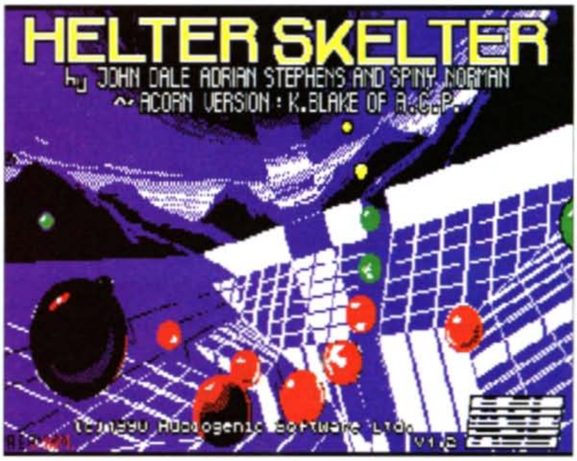
Oddly enough the world that you are defending is constructed in platform game fashion – single screens, with several platforms floating in mid-air. Each is inhabited by one or more randomly moving monsters just waiting to be bounced. Being an ace tactician, my first inclination was to ricochet around the screen as fast as possible, obliterating everything that I touched.

After I had doubled the indigenous monster population in five seconds I decided to adopt a more subtle approach – so I sat down and read the instructions.

The accompanying script indicated that the programmers had anticipated my sledgehammer approach by specifying the order in which the monsters must be despatched.

On all occasions, the next one to be blatted is highlighted by a large white arrow hovering above its head. Contact with any other beast induces instant binary fission, the result being two furry fiends scurrying around the screen instead of one.

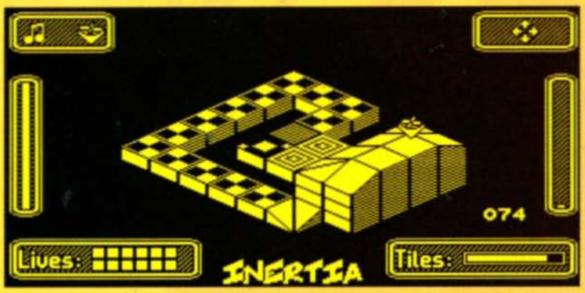
Don't be put off by the fact that you can literally sprint through the first few screens, as this is a deliberate ploy to boost your confidence. Things soon begin to increase in both complexity and difficulty – don't forget that you have a total of 74 levels to complete before you reach the end! Helter Skelter's monsters are not in any way harmful to the bouncing ball and the game's controlling factor is time.


HELTER SKELTER
by JOHN DALE ADRIAN STEPHENS AND SPINY NORMAN
ACORN VERSION : K.BLAKE OF A.C.P.
Audiogenic Software Ltd.
V1.2

Opening screen

A digital clock counts down the seconds as you race to obliterate the monster masses. Tension is heightened by a rapid ticking sound that starts at the 10 seconds marker.

Scoring is relatively simple. You receive 500 points for every monster you zap, a further 1,000 bonus for every second that remains on the clock, and a final skill



display you get an indication of sound status, which of the craft types is in use, whether the keys are normal or reversed and whether the pause option has been selected.

At the bottom is the useful game information – lives left, score and tiles still to be found. The sides of the screen have the time indicators.

A tile must be found before the time runs out or a life is lost. Each time you do collect a shaded tile, the timer is reset. The sound is fairly basic – a few beeps when the craft hits a wall.

It can be turned off, although it's not particularly intrusive.

We have come to expect quality software from The Fourth Dimension and the company has not let us down with Inertia.

This is a first rate game with just the right mix of ingredients.

It requires close control and thought and has enough of a frustration factor to call for yet another go. Recommended.

Rog Frost

049
Lives
INERTIA
Tiles

Sound	7
Graphics	8
Playability	9
Value for money	9
Overall	8

bonus which is halved every time you press the bounce button.

This final bonus encourages a player to adopt the most economical approach to completing a screen – this is also probably the quickest.

Variety is introduced by means of various tokens that appear at random throughout the game. Time limit permitting, you may be able to collect the letters E-X-T-R-A and be rewarded with an additional ball.

Alternatively there is a range of symbol tokens that can temporarily paralyse the monsters, interrupt the passage of time, or best of all, teleport you to the next level.

Sound is used sparingly: There is no title tune and the spot effects are simple, but this doesn't really detract from the game's appeal.

Helter Skelter strikes a good balance between graphic detail and colour use. On the animation front, the characters exhibit flicker-free and fluid movement, with the realistic response of the ball to the apparent gravitational effects being worthy of note.

If you become bored with playing your way through the same old levels time after time and you're not good enough to get any further, try pressing E while you're on the title screen.

Once the discrete message Edit mode has disappeared you will be faced with a blank screen – a canvas upon which you can express the more devious side of your personality.

This built-in level designer allows you to create an infinite number of new screens, provided that you save them to disc or tape in groups of 40.

You are given total control over the size and location of all platforms, the number of monsters present, the starting position of your ball, the time allocation and the size of the low bounce bonus.

The only failing of this otherwise powerful editor is that you cannot edit a screen once you have committed it to memory. If you've used game editors in the past you will realise the magnitude of this omission.

There is no way that you will ever create a well balanced level at the first attempt – it will always be too easy, too difficult or just downright impossible!

I would rate Helter Skelter as one of the better platform games to have hit the market in recent years.

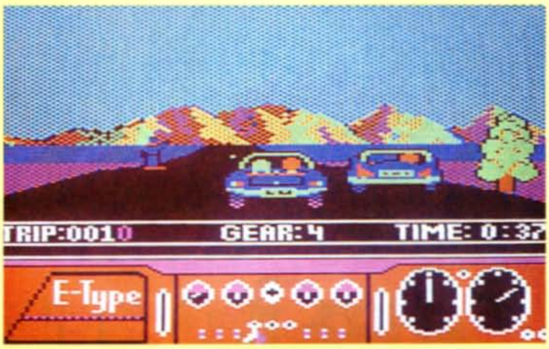
Simplicity is the keyword throughout: Simple controls, simple gameplay, simply fun!

Jon Revis

Sound	7
Graphics	8
Playability	9
Value for money	9
Overall	8

E-TYPE

. . . on the straight and narrow



Price: £9.95 (tape) £14.95 (5.25in disc)
£15.95 (3.5in disc)
Supplier: The Fourth Dimension, Dept. 4444, 1 Percy Street, Sheffield S3 8AU.
Tel: 0742 700661

WHO dared to say that the days of the good old BBC Micro were numbered? Less than a year after the original release for the Archimedes series comes the 8-bit version of Gordon Keys' excellent E-Type racing game, proving that our trusty friend is capable of reproducing equally high class games.

If you are unfamiliar with the scenario here's a quick resumé: You and your passenger have been left in control of a gleaming Jaguar E-Type worth £70,000. All you have to do is complete the various tracks presented to reach the coveted first place in the Hall of Fame.

As you will have come to expect, a number of hazards are lying in wait for your every mistake. To begin with there are the other cars in the race – run into the back of them and your speed is reduced. Do it once too often and the game ends.

Other obstacles include boulders, trees, electricity pylons and roadside bushes – plus roadworks, of course. Colliding with them increases damage to your car until it finally falls to pieces.

Also beware oil spills which send you slipping around for a short – and possibly crucial – period.

The display shows a view of the track from behind your vehicle, with a car dashboard including a rev counter and speedometer. Several different tracks are available, as are skill levels. Selection is simple – just press the appropriate toggle key.

Gameplay is very similar to the Archimedes version. The tracks appear to be identical and only a few features are missing.

Obviously the colour on this version is much inferior to that of the 32 bit version, although a good attempt has been made to compensate by using sucessful colour mixing techniques.

Missing features are the road cones, the time bonus messages and the automatic gearbox feature.

You may rightly question how the tracks can be completed if the time bonus messages have been removed. The truth is that they have been substituted slightly – the once-innocent policemen now have to be knocked down for you to qualify for your quota of extra time.

I missed the automatic gearbox at first – I always use it when playing the Archimedes version for simplicity's sake – but after a few attempts I learned to cope with manual gear changing.

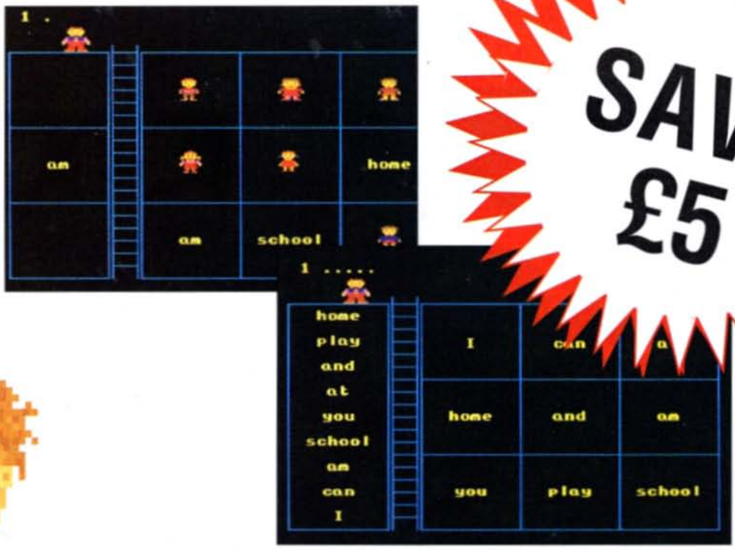
Anyone expecting a pure copy of the Archimedes version can forget it. Although the gameplay is very similar, the graphics are for obvious reasons of an inferior calibre, but by 8 bit micro standards are still very impressive.

I found E-Type enjoyable and addictive and recommend it to all racing game addicts.

Stephen Wade

Sound	6
Graphics	9
Playability	9
Value for money	9
Overall	8

PLAY AND READ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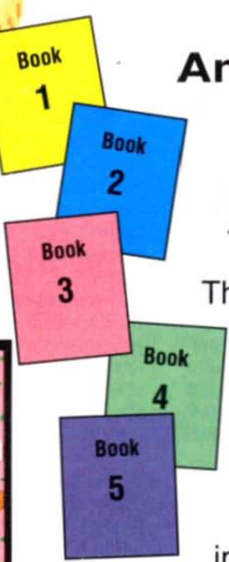
SAVE £5

Learn to Read with Prof


Book 1
Book 2
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Book 5

An integrated package consisting of audio cassette, disc and FIVE reading books!

This is one for you and your child to work through together. Aimed very definitely at the four year old through to the ability level of being able to understand 63 simple words. A great way for your child to start to read in an approved and enjoyable way.

"The people who wrote this know what they are talking about... An excellent package of its kind"
– The Micro User

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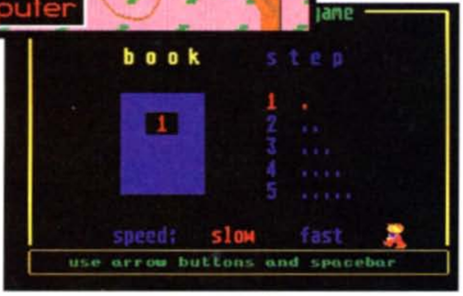
game
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step
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1
2
3
4
5
speed:
slow
fast
use arrow buttons and spacebar

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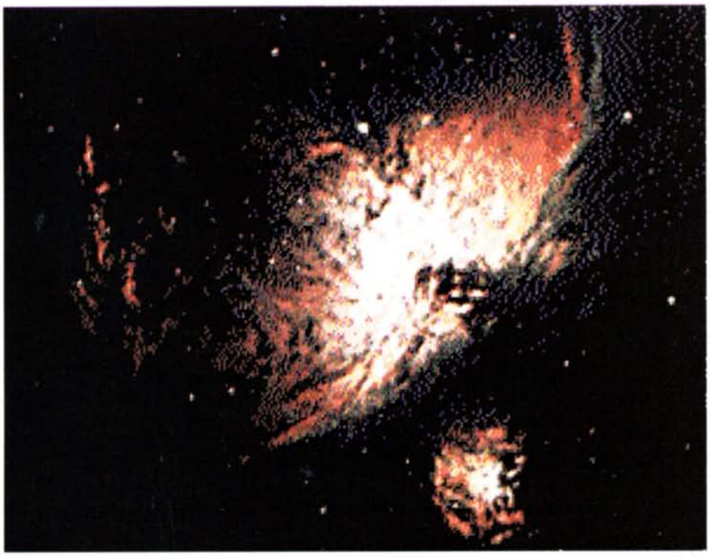
It's not PD!

Teri Paul presents further thoughts on the PD world



Orion nebula

RIGHT, it has come to my attention – from letters from you and the PD libraries themselves – that there is still confusion over what PD software actually is and what it isn't.

It's really very simple: PD software is only public domain – freely copiable by anyone to anyone – if, and only if, the author (or owner of the copyright) says it is.

For example, the programs published in this magazine are not PD – in fact you'll find that programs published in most, if not all, magazines are the same. They aren't PD because the owner of the copyright hasn't given up that ownership.

If you send me, or a PD Library, some software which bears a copyright message you'll get short shrift from me and them. So don't do it.

Also I'd get very suspicious of any software that has no copyright/public domain message at all. If it doesn't say it's public domain then don't treat it like public domain.

Certain bulletin boards distribute copyright material from magazines; this is naughty and they shouldn't do it. Luckily for them, most publishers within the BBC Micro market are fairly friendly and benevolent so aren't too bothered as long as no one is actually making money out of it.

However, there are some publishers of copyright material who are going to get very, very upset if they find out that their material is being pinched – which it is.

Someone sent me a PD disc that has film pictures and music copyright stuff on it – I also know that at least one other PD library is doing the same. This might seem fairly harmless, after all it's just one digitised picture and some music to go with it. The music is good, so is the picture. But, and it's a really big but, film companies are huge bureaucracies and they don't take kindly to anyone stealing their material.

Trust me, the amount of paperwork required to get just one screen shot of, say, Star Trek into the magazine is amazing.

And any infringement that is discovered is dealt with using the full force of the law. Most film and music companies get very upset about people who steal their images or sounds – and they just love going to court, because there's no such thing as bad publicity.

'Nuff said.

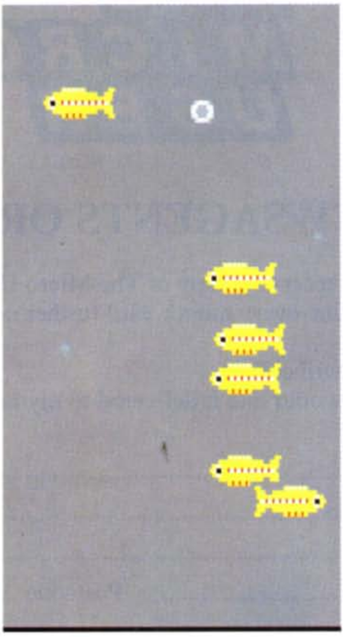
Silly stuff

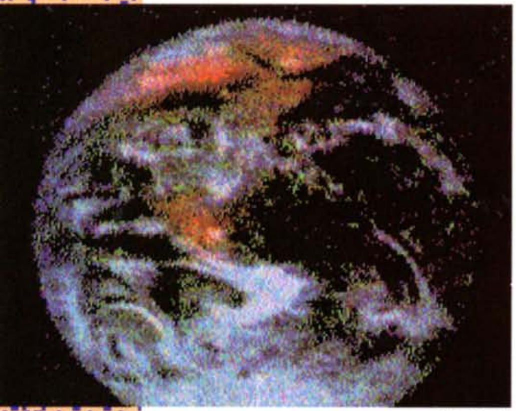
One of the most popular forms of PD software for the Archimedes are silly DeskTop accessories, !Wanda is a good example. When we first got a copy of that the editorial staff of *Amiga Computing* were absolutely riveted by it – the Amiga is a multi-tasking machine too, but they can't do what we can do.

I have heard of a DeskTop !Duck but I've yet to see it – I'll pass it on as soon as I get it. The only problem with these accessories is that you can usually only have one operating at a time.

The way they work is to create a big window covering the main screen, excluding the icon bar, behind all the other windows. Then they just move their silly icons around

➤





The Earth

➤

in this window. Of course if there's more than one the latest will obscure any earlier ones.

There is a way of specifying a transparent window, unfortunately this is less than useless because the Wimp Manager still doesn't update what's behind it.

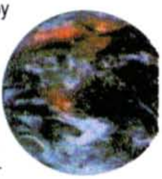
Perhaps the next release of Risc OS will improve this situation – I can think of many uses for properly transparent windows, not just silly ones. Of course, the real solution would be some way of getting each of these silly accessories to use the same window. You'd need a central program that sets up the window, plus the accessories which – using the Risc OS message system – could add and modify icons in the window.

OK, that's enough hints – one of you geniuses get cracking on it and I'll give a prize to what I consider the best version. Anyone sending a program with a GOTO gets the Teri Paul boot immediately!

Another quick hint to all silly accessory programmers – always use *Wimp–PollIdle* not *Wimp–Poll*. This ensures that your programs don't interfere with the foreground tasks that the user is working on.

Subscription disc

The monthly Risc OS disc, which I seem to have charge of now, is beginning to get a little bit tight for space – I had to leave off one of my brand new, never before heard on an Archimedes Amiga SoundTracker modules, it's included this time. Once I get hold of David Pillings PD de-archiver I'll stick it on the disc and we'll be able to cram more on.



In fact, the !STracker module is rather appropriate considering the music theme of this month's issue. You'll also find a demo copy of !Rhapsody, the new music composition program from Clares. As a demo it's very well protected – you can't load (it automatically loads four files) and you can't save. You can edit and play the music through the built-in Archimedes sound system. If you've got a Midi output and a Midi instrument you can play the music through that too.

Mike Cook has given me a couple of discs of stuff. There's two screens from an astronomical bulletin board, these need to be loaded using !Translatr and look really good, as the pictures here show. He's also given me two applications which I've included, but if you don't understand them don't ask me!

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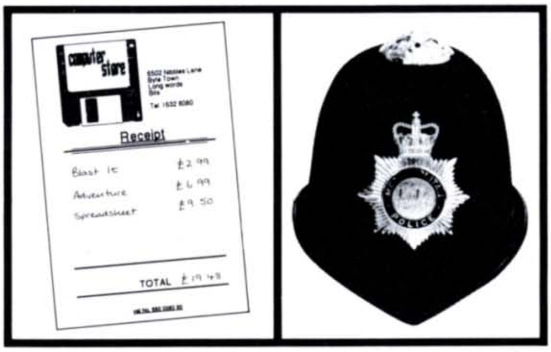

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(B) BBC B (M) Master 128 (C) Compact (A) Archimedes

Weighing the trends

Mike Cook explores the capabilities of a novel graph drawing package

Product: Graphbox
Price: £79.95 single user £799 network licence
Supplier: Minerva Software,
Tel: 0392 437756

With Graphbox from Minerva, you can present data in a wide variety of graphic styles, it's designed to be used on the Risc OS desktop and is fully compatable with it.

The output is in the form of !Draw files, which means that you can use !Draw application to make adjustments or enhancements to your final graph. It also means that your graphs can be easily incorporated into other documents and desktop publishing packages.

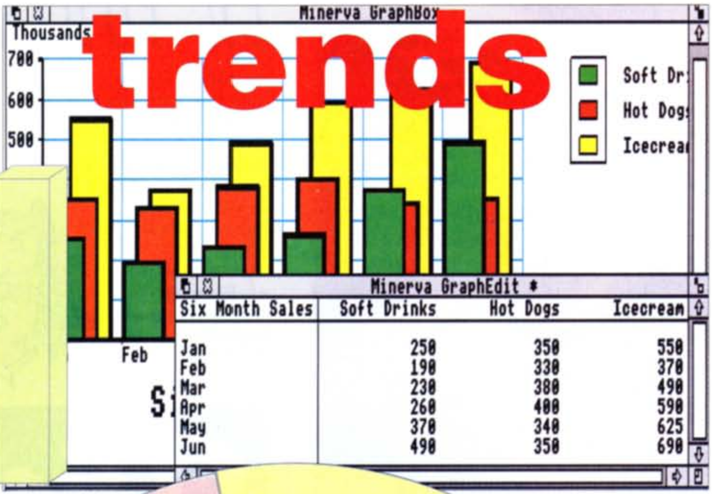
Basically Graphbox consists of two separate applications, one that prepares the data and another which turns it into a graph. However you aren't confined to using the data preparer, as Graphbox will accept other forms of files, including Ascii ones, as its data input. So you could write a Basic program that outputs its data in the form of an Ascii file and then have Graphbox do all the fancy work and turn it into a graph.

GraphEdit is used to prepare the data: When run you are presented with a display showing two columns for data entry, although you can easily add more. Entering the numbers is a smooth operation, with the cursor moving from one column to the next every time you press Return.

When you reach the end of the available columns you are automatically placed at the start of the next row. Editing at any place in the display can be achieved by pointing and double-clicking with the mouse. You can also move and copy whole columns. An options window lets you prespecify the type of graph you want to produce. The resultant data is in the form of text files, and are saved with the standard method of dragging icons.

Graph types available

- Scatter chart
- Scatter with error bars
- Line graph
- Line graph with error bars
- Bubble chart
- Polar scatter chart
- Polar line graph
- Stacked area chart
- Cumulative stacked area chart
- Bar chart
- 3D Bar chart
- Stacked bar chart
- Percentage bar chart
- Horizontal bar chart
- Horizontal 3D bar chart
- Horizontal stacked bar chart
- Horizontal percentage bar chart
- Pie chart
- Surface chart
- Wire surface chart



Six Month Sales	Soft Drinks	Hot Dogs	Icecream
Jan	250	350	550
Feb	190	330	370
Mar	230	380	490
Apr	260	400	590
May	370	340	625
Jun	490	350	690

Porting finished graphs is easy with Graphbox

Graphbox draws the graphs of which there are 20 different types to choose from (see adjoining table for the full list). Producing one simply involves dragging your data file into the Graphbox window. It is drawn – not exactly at lightning speed – and legends, titles and axis labelling is performed. From here you can view your graph in any of the different formats, although some do not make a sensible job of displaying the data.

For example, the polar diagram of two different types of microphone sensitivity are fairly meaningless when plotted as a 3D histogram, but that is only to be expected.

One useful feature is that the graph's axis can be linear, logarithmic or even your own function. This is very useful when plotting experimental results. By choosing the correct axis function you can get straight line graphs which are much easier to read, interpolate and extrapolate. When the graph is to your liking you can save it as a !Draw file.

The 36 page manual, with contents and index, provides a simple tutorial section as well as a reference section covering all the options and variations in the two programs. There are also screen shots of each graph type, along with an explanation of how the data is treated.

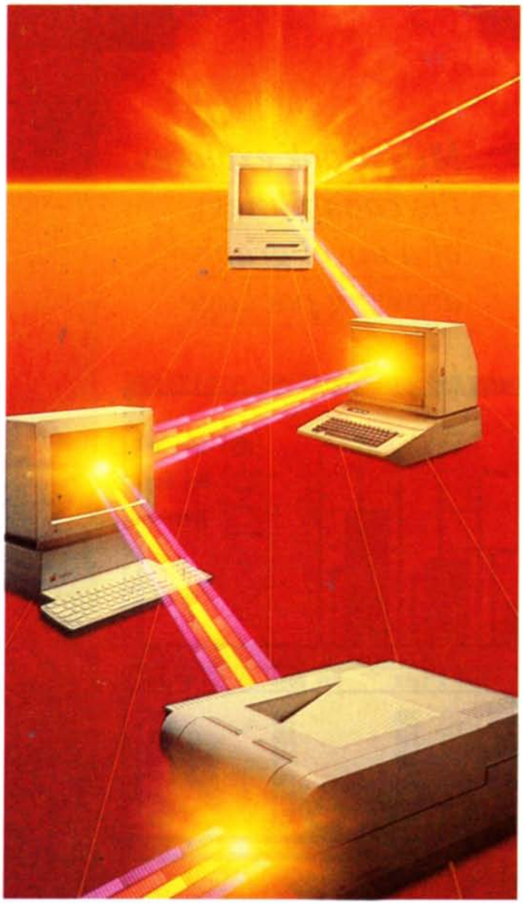
In addition to the programs there are data files containing data that illustrate all the major graph types. Plus a pullout overview from the middle of the manual doubles as a registration form.

Summing up

All in all, a good package with a wide range of options, however I have a few minor quibbles. First of all the re-drawing speed can be slow, especially when there are a lot of data items. This is most irritating when it is redrawing "damage" done by the pop-up menus.

Second, the applications do not install themselves on the icon bar. Instead you must have the window open all the time for these applications to be in memory. Closing the window closes the application, requiring it to be reloaded from the disc.

Finally, while the single user price is reasonable if a bit on the high side, the network licence price is downright silly. This sort of costing only encourages piracy among network users, who probably would be willing to pay four or five times the unit price for a network licence.



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FAX: 0527 63084

More Plus marks

Ian Whitmore assesses the improvements in Acorn's own word processor

THE official Acorn word processor, First Word Plus, has grown up and joined all the other good 32 bit products as a Risc OS multitasking package. And it's a great improvement. As such it now matches the behaviour expected of good software.

Once loaded it appears as a page icon on the bar. Documents already in existence can be loaded by dragging them on to the page icon or, more simply, by double clicking them from a directory viewer.

In fact, in true Risc OS style, if the filer has already seen First Word Plus then double clicking on a First Word Plus document will load the application on to the bar and open a window on the document. Figure I shows a standard test document in a DeskTop window.

If you have the original edition you can see that the bottom of the screen is no longer cluttered with reminders of the function keys and the character set.

However both these facilities can be shown, as the keypad – Figure II – from the iconbar icon menu and by using !1stChars an application supplied with First Word Plus, see Figure III. In fact I find it easier, as both are in moveable resizeable DeskTop windows that can also be placed behind other windows.

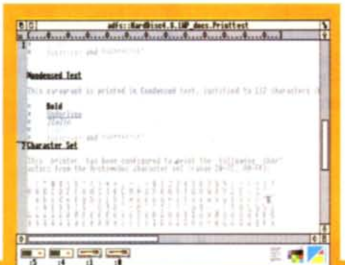
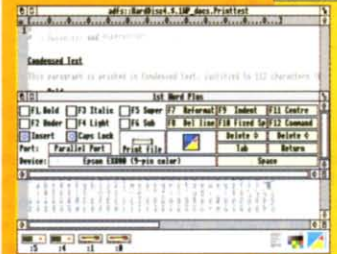

adfs::HardDisc4.$.1WP_docs.Printtest
Condensed Text
Bold
Character Set

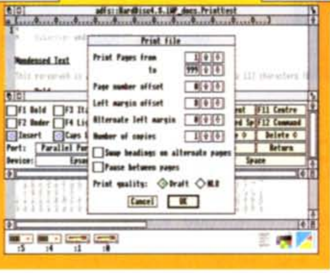
Figure I: A document window


adfs::HardDisc4.$.1WP_docs.Printtest
Condensed Text
1st Word Plus
F1 Bold
F3 Italic
F5 Super
F7 Reformat
F9 Indent
F11 Centre
F2 Under
F4 Light
F6 Sub
F8 Del line
F10 Fixed Sp
F12 Command
Insert
Caps Lock
Delete
Delete
Print file
Tab
Return
Space

Port: Parallel Port

Device: Epson EX800 (9-pin color)

Figure II: The keypad window


adfs::HardDisc4.$.1WP_docs.Printtest
Print file
Swap headings on alternate pages
Pause between pages
Cancel
OK

Print Pages from 1
to 999
Page number offset 0
Left margin offset 0
Alternate left margin 0
Number of copies 1
Print quality: ◇ Draft ◇ NLQ

Figure IV: The print dialogue box

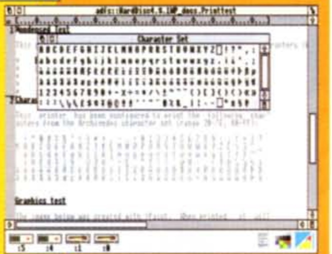

adfs::HardDisc4.$.1WP_docs.Printtest
Condensed Text
Character Set
Graphics test

Figure III: !1stChars application window

All the known bugs have been cured and access to all DeskTop modes makes the choice of screen memory against document size an easier one for those short of memory.

I currently use mode 78 supplied by Computer Concepts with Impression on a multisync monitor and this gives an excellent result with First Word Plus.

New features include the ability to change between uppercase and lowercase using Control+V. An addition to the style menu allows single characters or block-marked areas to be case changed. You can force all upper or all lower case, change case or force Title case selection with all leading characters only in upper case.

In similar manner to normal DeskTop use, function key 12 now offers access to the Command Line for * commands. This has meant that the allocation of function keys has changed a little, with F7 now being reformat. That takes a little getting used to.

Many of the control windows have been improved in layout. In particular, numeric input can usually be selected by increase and decrease icons as well as directly entering the value.

The spelling checker now has a 70,000 word dictionary and can be loaded and removed at will, again allowing control over the use of limited memory.

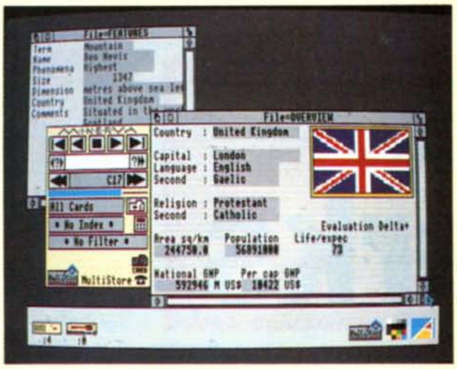
Perhaps the largest change is the move to Risc OS. File movement now fits the Risc OS format, most being possible simply by dragging icons. Printing is achieved by dragging a saved file on to the printer icon on the keypad.

The print window – Figure IV – gives the usual options, printer drivers being selected by dragging them on to the keypad. All previous printer drivers, dictionaries and so on are supported, although you may need to alter their filetype before they are recognised.

Product: 1st Word+
Price: £91.94
Supplier: Acorn Computers Ltd., Fulbourn Road, Cherry Hinton, Cambridge. CB1 4JN
Tel: 0223 245200

Summing up

Acorn should be congratulated on this new edition, although I have no doubt that others will still find fault. Whether or not current owners should upgrade is a more difficult decision, as the price is quite high. I think you have to look carefully at the benefits and make up your own mind.


File=FEATURES
File=OVERVIEW
MINERVA
All Cards
• No Index •
• No Filter •
C17
MultiStore

Term Mountain
Name Ben Nevis
Phenomena Highest
Size 1347
Dimension metres above sea le
Country United Kingdom
Comments Situated in th
Scotland

Country : United Kingdom

Capital : London
Language : English
Second : Gaelic

Religion : Protestant
Second : Catholic

Evaluation Delta•

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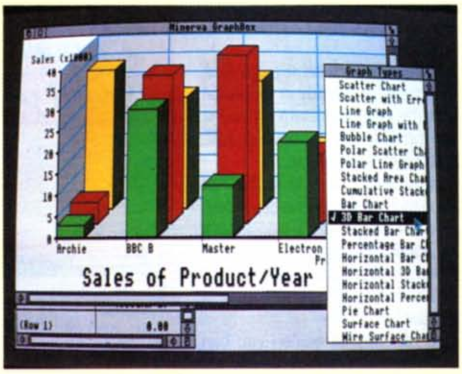
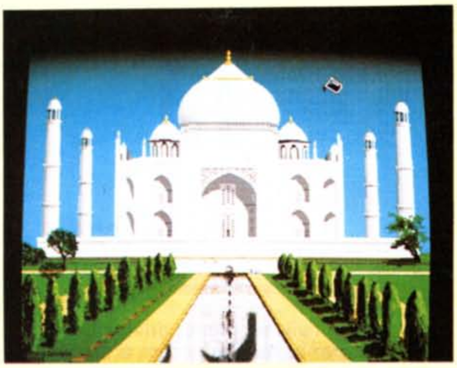

Minerva GraphBox
Sales (x1000)
40
35
30
25
20
15
10
5
0
Archie
BBC B
Master
Electron
Sales of Product/Year
(Row 1)
0.00
Graph Types
Scatter Chart
Scatter with Err
Line Graph
Line Graph with
Bubble Chart
Polar Scatter Ch
Polar Line Graph
Stacked Area Cha
Cumulative Stack
Bar Chart
✓ 3D Bar Chart
Stacked Bar Char
Percentage Bar C
Horizontal Bar C
Horizontal 3D Ba
Horizontal Stack
Horizontal Perce
Pie Chart
Surface Chart
Wire Surface Cha



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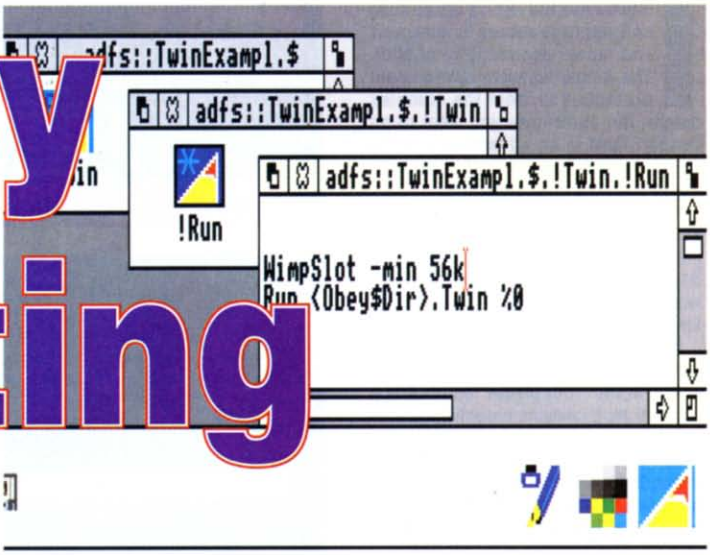
Easy editing



```
WimpSlot -min 56k
Run <Obey$Dir>.Twin %0
```

The !Twin run file

Using Twin with Risc OS is possible – Andrew Cumming shows how

IN the distant past, when the only Archimedes' operating system was a beast named Arthur, Acorn released a text editor called Twin. With the advent of Risc OS this was partially replaced by the multi-tasking !Edit – but Twin still offers many advantages: The keyboard response is much faster, as are the very comprehensive search and replace operations.

Twin's concurrency allows you, for example, to type in a source file and pass it through a compiler without leaving Twin, and then to locate any errors produced in the original source code.

While !Edit runs in the multi-tasking DeskTop environment, and also allows a Task Window to be set up, Twin seems to offer a much more efficient environment for the programmer.

Though it cannot multi-task within the DeskTop, Twin can be integrated very effectively with it.

Firstly, create a new directory named !Twin. Inside this place the Twin program file, altering the load address as described in the panel. Note that to open the !Twin application directory you must hold down Shift while you double-click.

Using !Edit, create a new Obey file – using Create from the icon bar menu – and enter the following, saving it inside the !Twin directory as !Run:

```
WimpSlot -min 56k
Run/<obey$dir> .Twin %0
```

Twin will now be run by double-clicking on the !Twin icon.

With the above !Run file, Twin will run with a minimum of 56k, and this leaves approximately 4k for text. The minimum amount of memory free for text can be increased by altering the Next slot in the Task Manager window.

A maximum value can also be set. Twin will then take an amount of memory between these two extremes, depending on how much is free. For example, to set a maximum value of 100k, change the command to:

```
WimpSlot -min 56k -max 100k
```

To force a certain amount of memory make the maximum and minimum values the same:

```
WimpSlot -min 100k -max 100k
```

The %0 parameter after the Run command means that any parameter supplied will be passed to Twin. So from the command line, typing:

```
*!Twin filename
```

will run Twin and load the specified file.

You can achieve the same effect using !TinyDirs from Application Disc 2. Double-click !TinyDirs to load it then drag !Twin on to it. Now if you drag a file to be edited on to the !Twin icon on the icon bar Twin is run with the dragged file as its parameter.

To improve the speed here the !Twin application can be copied on to a ram disc first – 48k is all that is required.

Once in Twin, you can exit to the DeskTop by pressing Shift+f4 and pressing Return in response to the prompt.

If you loaded a file by dragging it on to the icon you can save it with the same pathname by pressing f3 and then Copy. The pathname will include the filing system and disc name and can be edited before saving the file. This avoids the need to remember long pathnames and you don't have type them out.

So there you have it – you're all set for easier editing and concurrent processing all from the DeskTop.

Altering Twin

Normally Twin loads at address &80000, which gives approximately 100k for text and 400k for concurrent applications such as a compiler. Which means that approximately 500k would be needed to run the program from the DeskTop.

If you are only going to edit text files and not run concurrent applications, or need less than 400k for the application you will be running, this is a waste of valuable memory, particularly on 1Mb machines.

Fortunately a utility called FileMove is supplied with Twin which can alter its load address. Before copying the Twin file into the !Twin directory, change its load address by typing:

```
*FileMove Twin 8000
```

This is also described in Appendix D in the manual. A load address of &8000 will give no memory at all for concurrent applications and is the lowest value that can be used while, for example, &10000 will give 32k.

The !Run file given in the main text and all further examples assume that a load address of &8000 has been set, which means no concurrent applications can be run. If you require some memory for other applications, simply add this figure to the figure given. For example, if a load address of &18000 had been set, the 56k in the !Run file would become 120k.

Command

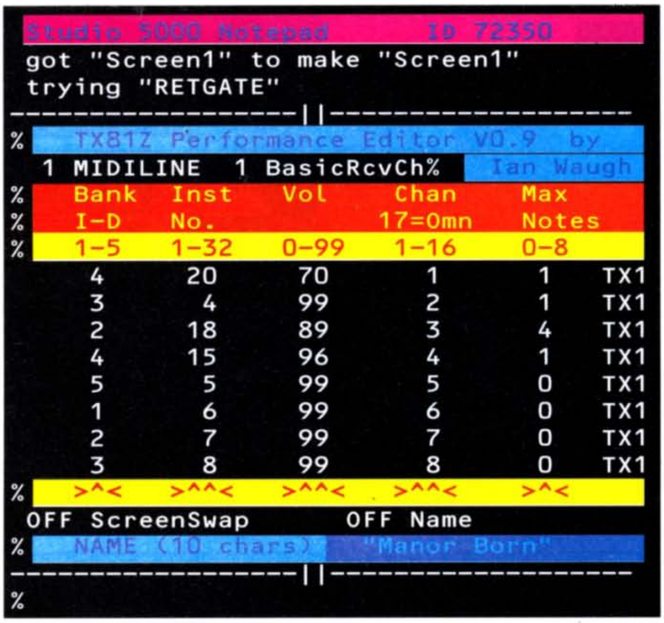
IF you have the Hybrid Music 2000 unit you have access to the power and music connectivity of Midi. The Ample software environment protects you from the complex details, but sometimes you want to go deeper. Txed is an adventure into the world of Midi System Exclusive messages and Ample programming.

As an example we'll be programming a Yamaha TX81Z – currently one of the UK's most popular expanders – but even if you don't own one there are several techniques in the program which you can adapt for your own use.

You can simply type in the program and use it as a utility – you don't have to know how it works – but please read this text carefully as it contains essential items of information.

To run Txed you will need Hybrid's Music 2000 – with Music 5000 – but all else is optional – even the TX81Z, although without it you won't be able to check that the program works properly.

Txed can be used to edit 90 of the TX81Z's Performance Memory which you use when playing multi-timbral compositions. It's based around two Control Panel screens so the Notepad module must be present or accessible from the M directory on your system disc.



```
Studio 5000 Notepad              ID 72350
got "Screen1" to make "Screen1"
trying "RETGATE"
-----------------||------------------
%  TX81Z Performance Editor V0.9  by
 1 MIDILINE   1 BasicRcvCh% Ian Waugh
%  Bank   Inst   Vol   Chan    Max
%  I-D    No.          17=Omn  Notes
%  1-5    1-32   0-99  1-16    0-8
   4      20     70    1       1    TX1
   3       4     99    2       1    TX1
   2      18     89    3       4    TX1
   4      15     96    4       1    TX1
   5       5     99    5       0    TX1
   1       6     99    6       0    TX1
   2       7     99    7       0    TX1
   3       8     99    8       0    TX1
%  >^<    >^^<   >^^<  >^^<    >^<
OFF ScreenSwap        OFF Name
%  NAME (10 chars)    "Manor Born"
-----------------||------------------
%
```

Frequently modified TX81Z parameters

Entering the program

Type in the listing shown – take care not to make any typing errors – and save it. There are only two words in which the spacing is important and they are *Screen1* and *Screen2*. In fact, the spacing is crucial, so enter these words in Notepad and make sure everything is spaced exactly as in the listing.

If you look at the accompanying screen shots you'll see that the panels are coloured. If you've tried to put colour codes into Notepad you'll know that you can't, at least not by normal means. But you can using #OUT which sends Ascii codes to the screen. This is where the *Q* word comes in.

Get *Screen1* into Notepad, press f2 to enter panel mode – block cursor – site the cursor on the 1 in the second line from the top, press and release Shift and the screen should now be coloured.

This works because when you change a parameter – or simply activate it by pressing and releasing Shift – in panel mode, the program executes the line above the cursor, in this case containing *Q*.

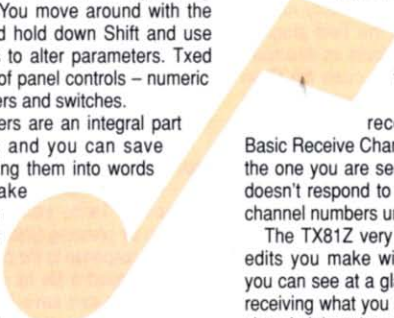
Ignore any error messages at the bottom of the screen and MAKE the word. Do the same with *Screen2*. You can now delete *Q* and *q* and save the program. You can alter *Q* to create coloured screens of your own. Note the use of control codes 9 and 10 to move around the screen.

Colour codes cannot be copied and if you SPOOL the screen words then EXEC them back again they will be lost, although you can save and load as normal.

Using the program

Type Txed to enter the program. The two screens operate in the same way as any Control Panel: You move around with the cursor keys and hold down Shift and use the cursor keys to alter parameters. Txed uses two types of panel controls – numeric for the parameters and switches.

The parameters are an integral part of the screens and you can save them by MAKEing them into words just as you make any word in Notepad. But by doing so you lose the original screen settings but you can, of course, save everything by saving the complete program. *Screen1* contains the data you will most often wish to edit when creating Performances. *Screen2* contains settings you will probably not need to alter so often.



Here's a brief explanation of the functions, although they will be familiar to you if you've been creating Performances from the TX81Z's front panel.

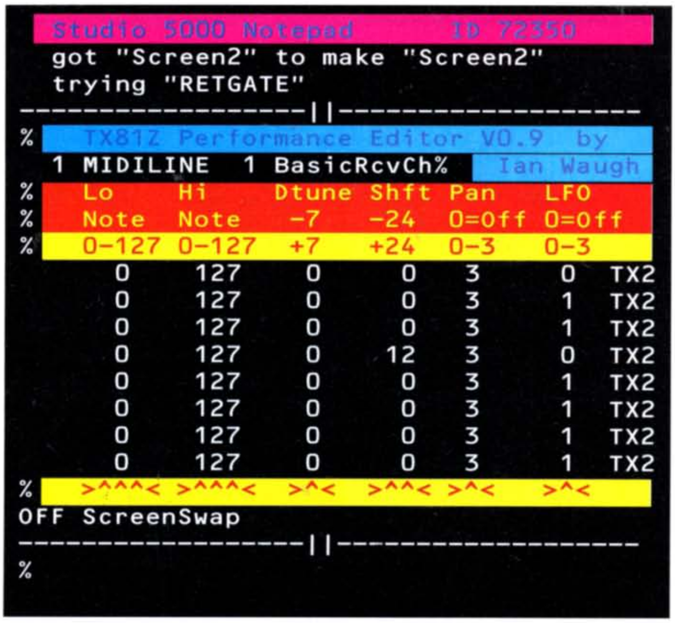
BasicRcvCh is the Basic Receive Channel on which the TX81Z receives System Exclusive data and program changes. You probably set this to one and forget about it, but it's here to alter if you wish.

Txed will not let you set this to Omni as there is no reason for doing so when using the program – although you could re-program this function.

For the TX81Z to receive any message the Basic Receive Channel must already match the one you are sending on. If your TX81Z doesn't respond to Txed, work through the channel numbers until you get a response.

The TX81Z very helpfully reflects all the edits you make with Txed in its LCD, so you can see at a glance whether or not it is receiving what you are sending. If it doesn't show it, it hasn't received it.

The next two lines are the parameter headings, and the numbers beneath them

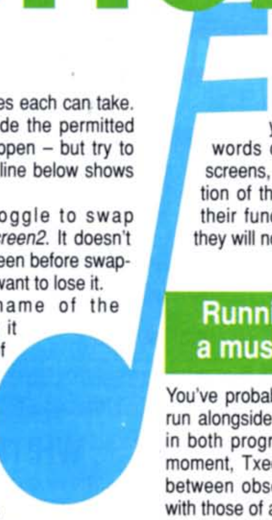


```
  Studio 5000 Notepad          ID 72350
  got "Screen2" to make "Screen2"
  trying "RETGATE"
-----------------||-----------------
%  TX81Z Performance Editor V0.9  by
  1 MIDILINE  1 BasicRcvCh%   Ian Waugh
%  Lo    Hi     Dtune Shft Pan   LFO
%  Note  Note    -7   -24  0=Off 0=Off
%  0-127 0-127  +7    +24  0-3   0-3
       0   127    0     0   3     0  TX2
       0   127    0     0   3     1  TX2
       0   127    0     0   3     1  TX2
       0   127    0    12   3     0  TX2
       0   127    0     0   3     1  TX2
       0   127    0     0   3     1  TX2
       0   127    0     0   3     1  TX2
       0   127    0     0   3     1  TX2
%  >^^^< >^^^<  >^<   >^^< >^<   >^<
OFF ScreenSwap
-----------------||-----------------
%
```

Less used TX81Z parameters

Ian Waugh shows how the Hybrid Music System can be used to control Midi peripherals

performance



indicate the range of values each can take. If you take a value outside the permitted range nothing should happen – but try to keep them in range. The line below shows the acceptable values.

ScreenSwap is a toggle to swap between *Screen1* and *Screen2*. It doesn't save the contents of a screen before swapping, so save if you don't want to lose it.

Name holds the name of the Performance – changing it requires just a little bit of care, so please read carefully: When the Name toggle is switched ON, the program transmits the name underneath – the one in between the quotes. To change this name, site the cursor on the toggle, press f2 to enter Text Mode, press the down cursor, type the name between the quotes and press f2 again. To send the name switch the toggle ON.

Screen2 works in exactly the same way as *Screen1*. The Pan and LFO numbers correspond to the following settings:

Pan 0 = off	LFO 0 off
Pan 1 = I	LFO 1 1
Pan 2 = II	LFO 2 2
Pan 3 = I II	LFO 3 vib

Like most Ample programs, you can load and alter the words of Txed in the Editors. The screens, however, rely upon the position of the characters inside them for their function. If you alter the layout they will not work.

Running Txed with a music program

You've probably realised that if Txed is to run alongside a piece of music, the words in both programs must not clash. At the moment, Txed's words are a compromise between obscurity – so they won't clash with those of a music program – and meaningfulness.

To run an existing piece of music with Txed, create an Ascii file of the music program with SPOOL and then EXEC it into Txed – the utilities disc also contains a MERGE command. Next create a suitable mix word based on *mix9* supplied with the Music 2000 and alter the *RUN* word – and part words if required – to incorporate *mix9*.

As Performance setups are saved with the program, it's easy to create separate Performance files which you can run before loading the music. If the music and Txed

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Using Txed on the fly

Because of Ample's concurrency, you should be able to play a piece of music and edit the Performance parameters on your TX81Z at the same time. This is the ideal way of working as you can easily audition various combinations of sounds.

But with all this Midi data flying around it's possible that some will end up in the wrong place. If the TX81Z stops responding, enter command mode – press Tab – and start the program again by typing Txed.

MAKE the screen first if you wish, although this will stop the music. If the music starts producing funny sounds, try sending the Bank or Voice parameters again by moving to them, pressing and releasing Shift.

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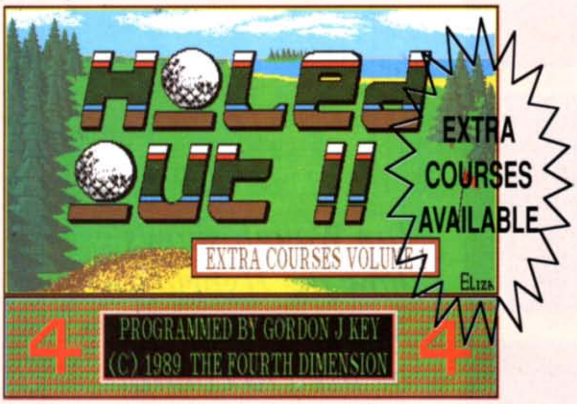

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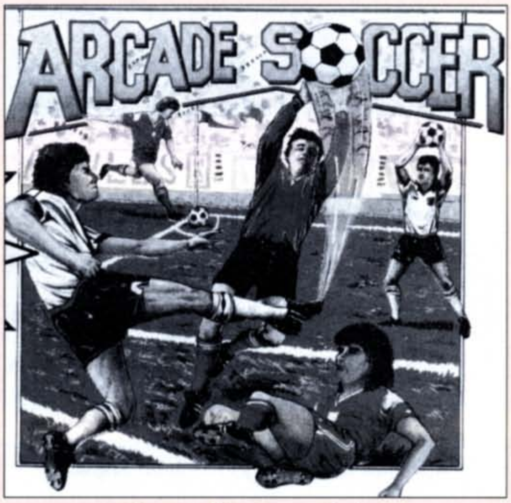

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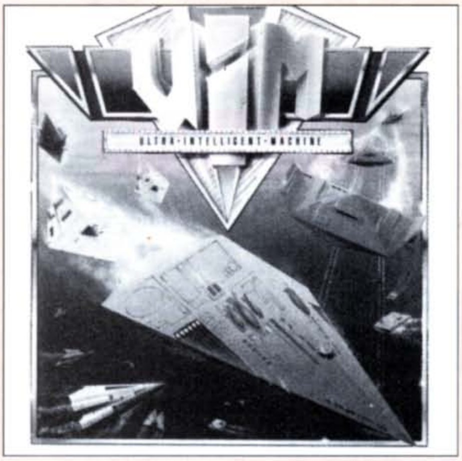

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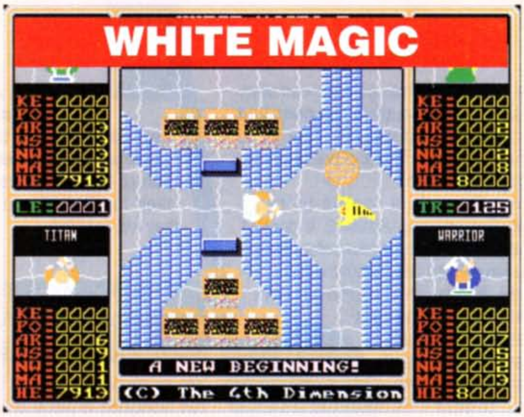

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can exist together you can store both music and Performance together.

To start you off, the parameters in the screens have been configured to produce a version of *To the Manor Born*, which is one of the demos supplied with the Hybrid Music System. Create an Ascii file of it and *EXEC it into Txed. The program listing already contains a suitable *mix9* definition, all you have to do is alter the last line of Manor's *RUN* word to:

```
"1234-9abcad"PLAY
```

As with other Control Panels, you can play it by pressing f1. This sends the contents of the entire screen to the TX81Z – all except the Name. This is a particularly powerful feature of Txed – well, of Ample and the Control Panel, really – which makes it easy to create, save, recall an send Performance set-ups. So to set up your TX81Z ready to play To the Manor Born, type Txed to call up *Screen1* then press f1. You will see the TX81Z's display reflect the parameters the program is sending. Select *Screen2* and repeat the process. Then type RUN and the music will play. The performances created by Txed are sent to the TX81Z's buffer and you will not overwrite any existing Performance data in the instrument. In order to save a Performance permanently to the TX81Z's Performance Bank, follow the instructions on page 36 of your TX81Z manual.

How it works

Here's a whistle stop tour through the operational features of the program if you are interested in adapting some of the techniques for your own use.

When you alter a parameter in panel mode – block cursor – the program sends ALL the parameters on that line to the right of the screen. *TX1* in *Screen1* collects them – all five get sent no matter which one is altered.

Words *xpos* and *ypos* return the X and Y positions of the cursor so the program knows which voice – stored in *vcno* – and which parameter is being altered. This is why it's important that you don't alter the spacing in the Screens. The five values are stored in the variables in the second line of *TX1* and tested using IF()IF statements and the *test* word to find out which one has been altered.

Then it's simply a matter of sending the new parameter to the synth. Simple is a relative term but let's see what happens if you alter the Maximum Note allocation of, say, voice one. The five parameters are zapped off to *TX1* but the first thing the word does is to check *ypos* to see what voice is affected and store it in *vcno*. Meanwhile, the five parameters are hanging around waiting for words which need numbers. They find them in the second line and all five are stored in variables. Our Maximum Note number is stored in variable *mv*.

Using *xpos*, the sixth line checks that the cursor is on the Maximum Note parameter and sends the value to *m*. This performs some offsets – to generate the number the TX81Z is expecting – and, in turn, calls *pced* which is named after the procedure used by the TX81Z to send Performance Edit Parameters.

The word *pced* first sends System Exclusive messages via *yamsys* which basically says this is a Yamaha instrument and here comes some system exclusive data on Basic Receive Channel 1. The blank MIDIOUT lines pick up the Max Note parameter data and send it. The routine ends by sending &F7, the code for *end of System Exclusive message*. You will notice that some of the other parameters have a lot more work to do.

The most complex is probably *voxtx* which sends voice and bank information. The TX81Z has five banks of 32 voices which equals 160 voices – Yamaha's definition of a voice is different from Ample's, a TX81Z voice corresponds to an Ample instrument.

Midi only has provision to handle 128 Program Changes so the TX81Z uses a most significant bit to select bank five. In order to register this on the display you also have to send the voice number. Anyway, the program takes care of all that so what you send is it what you see.

Midi messages apart, look at *Txed*, *key* and *ScreenSwap* to see how you can duplicate key presses from within a program and how to GET words into an editor. For serious programming the Ample Nucleus Programmer Guide (£19.00 from Hybrid Technology) is essential.

Considering the functions it performs, the program is remarkably compact thanks to the Midi words built into the Music 2000 and the conciseness of the Ample language.

TX81Z Performance Editor: Be careful if you alter this as the spacing in Screen1 *and* Screen2 *is crucial.*

```
"TX1" []  "TX2" []  "brc" []  "bv" []
"cv" []   "dv" []   "fv" []   "h" []
"hv" []   "init" [] "iv" []   "key" []
"mv" []   "p" []    "pced" [] "pv" []
"q" []    "rc" []   "s" []    "sv" []
"t1" []   "t2" []   "t3" []   "t4" []
"test" [] "v" []    "vcno" [] "vv" []
"Name" [] "Q" []    "char" [] "l" []
"xc" []   "xd" []   "xf" []   "xpos" []
"yamsys" [] "lv" [] "m" []    "mix9" []
"Screen1" []  "Screen2" []   "TXED" []
"ypos" []  "voxsys" []  "voxtx"[]
"BasicRcvCh" []  "ScreenSwap" []
"BasicRcvCh" [brc
rc#? 1#+
brc
]
"Name" [IF(xpos 0 #> %This is not f1
 IF( 10 #OUT %Cursor down
  10 FOR( yamsys &10 MIDIOUT
   COUNT 99 #+ MIDIOUT
   char MIDIOUT 9 #OUT %Cursor right
   &F7 MIDIOUT
  )FOR
 130 key 130 key
 )IF
)IF
]
"Q" [30q 37q 134q 157q
132q 10q 23FOR(9q)FOR
134q 157q 132q
3FOR(9q)FOR 132q
13q 9q 10q 129q 157q 131q
13q 9q 10q 129q 157q 131q
13q 9q 10q 131q 157q 129q
13q 9q 9FOR(10q)FOR 131q 157q 129q
13q 9q 10q 10q 134q
157q 132q 15FOR(9q)FOR
132q 157q 134q
```

➤

```
]
"q" [#OUT
]
"Screen1" [Q%  TX81Z Performance Editor
 V0.9  by
  1 MIDILINE  1 BasicRcvCh%   Ian Waugh
%   Bank  Inst   Vol    Chan    Max
%   I-D   No.           17=Omn   Notes
%   1-5   1-32   0-99   1-16    0-8
     4     20     70      1       1   TX1
     3      4     99      2       1   TX1
     2     18     89      3       4   TX1
     4     15     96      4       1   TX1
     5      5     99      5       0   TX1
     1      6     99      6       0   TX1
     2      7     99      7       0   TX1
     3      8     99      8       0   TX1
%   >^<   >^^<   >^^<   >^^<    >^<
  OFF ScreenSwap       OFF Name
%   NAME (10 chars)   "Manor Born"
]
"Screen2" [Q%  TX81Z Performance Editor
V0.9  by
  1 MIDILINE  1 BasicRcvCh%   Ian Waugh
%   Lo    Hi    Dtune Shft Pan   LFO
%   Note  Note   -7   -24  0=Off 0=Off
%   0-127 0-127  +7   +24  0-3   0-3
       0   127   0     0   3     0  TX2
       0   127   0     0   3     1  TX2
       0   127   0     0   3     1  TX2
       0   127   0    12   3     0  TX2
       0   127   0     0   3     1  TX2
       0   127   0     0   3     1  TX2
       0   127   0     0   3     1  TX2
       0   127   0     0   3     1  TX2
%   >^^^< >^^^<  >^<  >^^< >^<   >^<
 OFF ScreenSwap
]
"ScreenSwap" [IF(xpos 3 #= IF( "
""Screen2""GET"$+
 )ELSE(" ""Screen1""GET"$+ )IF
130 key
142 key
)IF
]
"TX1" [ypos 4 #- vcno #! %Voice number
1-8
mv#! cv#! vv#! 1#- iv#! bv#! %Store
    %panel Nos. Note Offset for Voice No
xpos 0 #= IF( %Send all if f1 is pressed
mv#?m cv#?xc vv#?v voxtx )ELSE(
 xpos 33 #= IF( mv#?m )IF
 26 26 25 xpos test IF( cv#?xc )IF
 19 19 18 xpos test IF( vv#?v )IF
 12 11  5 xpos test IF( voxtx )IF
)IF
]
"TX2" [ypos 4#- vcno#! %SEE "TX1" for
COMMENTS
fv#! pv#! sv#! dv#! hv#! lv#!
xpos 0 #= IF( fv#?xf pv#?p sv#?s
              dv#?xd hv#?h lv#?l )ELSE(
 xpos 34 #= IF( fv#?xf )IF
 xpos 28 #= IF( pv#?p )IF
 22 23 24 xpos test IF( sv#?s )IF
 17 17 18 xpos test IF( dv#?xd )IF
 11 12 13 xpos test IF( hv#?h )IF
  5  6  7 xpos test IF( lv#?l )IF
)IF
]
"TXED" [" ""Screen1""GET"$+
"MAIN" $+ init
142 key %Cursor Down
13 key  %Press Return
9 key   %Press TAB
130 key %Press f2
0rc#! %Set Basic Receive Chan
1 VOICES MIDIV
]
"brc" [yamsys
&10 MIDIOUT 123 MIDIOUT 1 MIDIOUT
1#- #11 rc#! MIDIOUT%New Basic Rcv Ch
                    %and store in rc
rc#? 15 #> IF(16rc#!)IF%If rc>15 then
%it's Omni mode so set to 16 to Transmit
rc#? 1 #<IF(0rc#!)IF%If rc<0 then ditto
&F7 MIDIOUT
]
"bv" [GVAR
]
"hv" [GVAR
]
"cv" [GVAR
]
"dv" [GVAR
]
"fv" [GVAR
]
"iv" [GVAR
]
"lv" [GVAR
]
"mv" [GVAR
]
"pv" [GVAR
]
"rc" [GVAR
]
"sv" [GVAR
]
"t1" [GVAR
]
"t2" [GVAR
]
"t3" [GVAR
]
"t4" [GVAR
]
"vcno" [GVAR
]
"vv" [GVAR
]
"h" [vcno#? 12#* 7#- pced
]
"char" [0 135 &FFF4 CODE #2 &FF AND
]
"init" [ 1 15 &FFF4 CODE #2 #2
]
"key" [#B12  138 &FFF4 CODE #2 #2
]
"l" [vcno#? 12#* 8#- pced
]
"m" [vcno#? 1#- 12#* pced
]
"p" [vcno#? 12#* 3#- pced
]
"s" [24#+ %Offset
vcno#? 12#* 5#- pced
]
"v" [vcno#? 12#* 4#- pced
]
"xc" [1#- %Offset
vcno#? 12#* 9#- pced
]
"xd" [7#+
vcno#? 12#* 6#- pced
]
"xf" [vcno#? 12#* 2#- pced
]
"mix9" [M5MIX 48,105=T
1 SHARE 2 VOICES MIDIV %synverb
 1 MIDILINE 1 MIDICHANNEL
2 SHARE 1 VOICES MIDIV %brassbow
 1 MIDILINE 2 MIDICHANNEL
3 SHARE 4 VOICES MIDIV %elecorgan
 1 MIDILINE 3 MIDICHANNEL
4 SHARE 1 VOICES MIDIV %pedal
 1 MIDILINE 4 MIDICHANNEL
PNUM SHARE
]
"pced" [yamsys
&10 MIDIOUT
    MIDIOUT
    MIDIOUT
&F7 MIDIOUT
]
"test" [t4#! t3#! t2#! t1#!%Store in
variables
t4#? t1#? #= IF(ON)ELSE(
 t4#? t2#? #= IF(ON)ELSE(
  t4#? t3#? #= IF(ON)ELSE(
OFF)IF )IF )IF
]
"voxsys" [yamsys
&10 MIDIOUT
vcno#? 1#- 12#* 2#+ MIDIOUT
    MIDIOUT
&F7 MIDIOUT
]
"voxtx" [iv#? voxsys %Send voice to fix
             %'bug' Re Bank 5
yamsys &10 MIDIOUT
vcno#? 1#- 12#* 1#+ MIDIOUT %Parameter
                   %No. for Voice Offset
bv#? 5 #= IF(1)ELSE(0)IF %MSB for Bnk 5
MIDIOUT &F7 MIDIOUT %End Sys Ex
bv#? 1#- 32#* iv#? #+ %Calculate Voice
voxsys        %No. from Bank No. & Send
]
"xpos" [0 134 &FFF4 CODE #2 &FF AND
]
"ypos" [0 134 &FFF4 CODE #2 #B12 &FF AND
]
"yamsys" [&F0 MIDIOUT &43 MIDIOUT
&10 rc#? #+ MIDIOUT
]
```

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Ian Waugh spins a pile of discs full of bright new sounds

AT this year's Frankfurt Music Fair I spotted French and German companies each with a library of Midi song discs – music recorded in Midi format ready to be loaded into a sequencer and played through your keyboard or expander. I wondered if the idea would catch on in the UK.

It turns out that British company "Hands on" Midi Software have been following exactly the same path. In fact they've been treading it for two years. Director David Clackett explained that they wanted to get it right before going public.

Now they have around 65 pieces of music on disc in Midi format for a variety of computers including the Archimedes in EMR's Studio 24 format. If, or when, other programs come along – such as Pandora's !Inspiration – the pieces will be made available in those formats, too.

The pieces were arranged specifically with Roland's CM (Computer Music) modules in mind, particularly the CM64. This costs around £789 and it's a combination of an MT32 expander and a U-110 sample playback module. It has virtually no front panel controls and is driven completely from a sequencer.

But if you don't have a CM64 you can still play the music using any Standard Midi-compatible instrument.

The track list in Studio 24 shows the instruments used and all you do is allocate those sounds on your equipment to the tracks' Midi channel numbers – or vice versa.

Half the fun lies in trying different sounds – a chance to create your own orchestra. You can, of course, play the music on Studio 24 using the Archimedes' internal sound. Plenty of scope for experimentation here too.

The only slight problem I encountered was rather clicky drum rolls. This, according to David Clackett, is due to Studio 24's low clock resolution.

Each disc holds a number of text files, the exact number depending upon the music it contains. These files hold general information about the pieces, lyrics if applicable, set-up instructions and a list of the structure of the song bar by bar.

There is also a list of the note allocations used by the pieces for the drum sounds. These conform to Roland equipment and you may have to reallocate some drum parts if you are using different instruments.

"Hands on" see the discs appealing to three markets – home users, the professionals and in education. The home user with little musical ability will still be able to play the pieces, examine them and experiment with the orchestration. The professional could use them on stage to recreate the sound of a complete orchestra.

Unlike backing tapes, the key of the pieces can be adjusted without altering the speed – and vice versa – and the performer can mute an instrument if he wants to play a part himself live. He could also introduce loops if he wanted to play an extended solo.

Educationally, the pieces offer a personal orchestra for instrumentalists to practise with. Ensembles could benefit, too, while on the technical side students can analyse the data with a view to improving their own programming skills. An insight into harmony and arranging may also be gained by studying the pieces, and "Hands on" intends to produce a study course of harmony using Star Sequences.

In addition, Daton is producing a range of material for use with the Associated Board of the Royal Schools of Music which will interest all students studying this syllabus. In these arrangements, the student will have a "perfect" example of the examination pieces to examine, dissect and practise with – and a teacher who doesn't rap your knuckles when you get it wrong.

The arrangements are produced by an associated company, London Orchestrations, which is well-known to singers and musicians throughout the UK. It supplies professional band arrangements – exactly like the record – of music as diverse as chart hits and big band standards. There are more than 4,000 arrangements in its catalogue so Daton has plenty of material to draw on.

The other main man behind "Hands on" is London Orchestrations' major arranger, Dave Tanner. As musicians, both Clackett and Tanner have always been careful to observe the copyright laws and all their productions are fully registered with the copyright societies so all artists and composers get their due desserts.

The titles fall into five categories – Chart Hits, Big Band Standards, TV & Film Themes, Light Orchestral and Classical. You specify the pieces you want on the order form and "Hands on" put them on a disc for you.

Summing up

I had great fun with these programs and can thoroughly recommend them to anyone wishing to play conductor, arranger or orchestrator. You can even have fun just dabbling – you don't have to be a proper musician. They have educational and entertainment value at all levels and at between £3.99 and £6.75 per tune they're excellent value for money. If you have Studio 24 you need at least one of these discs.

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The real benefit of the DELTA-CAT comes with custom written software such as the INTERDICTOR jetfighter simulator from CLARES MICRO PRODUCTS. Impact's Soccer Game – Arcade Soccer, and more programs to come soon.

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PROBLEM Solved

Your technical questions answered by MIKE COOK

Pot of trouble

I COPIED the joystick circuit for the BBC Micro from the Advanced Users Guide but it does not work. I've used 100kΩ potentiometers. Should the top of the pots be connected to Vref or the 5v line? – **Paul Bhatia, New Malden, Surrey.**

● *The circuit in the Advanced Users Guide is correct. The top of the pots should be connected to the Vref input if you have full mechanical travel on your joystick, but if you only have limited travel connect it to the 5v line.*

It could be that you have connected it to the 5v but the limited travel has been restricting the voltage to above the reference. In that case simply swap the two outer terminals on the pot.

You'll be able to get the necessary hardware from most big dealers.

Topics on the agenda...

- ***Copying data between different disc formats***
- ***Putting in the correct joystick connections***
- ***Making a Model B work like a Master***
- ***Taking a micro overseas for good***
- ***Using Chameleon with an Acorn monitor***
- ***Getting in touch with the blanking inputs***
- ***Banging against an intractable problem***
- ***Shortening a lead to become Elite***

Head-banger's relief

I HAVE just finished banging my head against the wall in a state of complete frustration after trying to solve a fault with my Swift Spreadsheet rom. The program seems to work perfectly in every respect until I try to load previously saved data – then I get the message *Bad character* and no data. I know the data has been saved because I can load it into the Mini Office Word Processor.

The rom has worked perfectly on two other BBC Bs, one with a QFS and the other with a standard Acorn DFS. My machine has a Watford DDFS 1.53.

I am now at my wits end. Can you help? – **David Coveney, Staplehurst, Kent.**

● *The error message you are getting is not from the operating system or from your DFS, so it must come from the spreadsheet itself. It presumable means it has come across a character that isn't within the expected range, consequently it aborts the load sequence and ignores anything it has loaded so far.*

What you need to know is whether this spurious character is being generated by the save or load process. One way to check this is to save some data from your friend's machine and then load it on yours. If it fails then it the load process must be at fault – but you should try saving on yours and then loading on another just to be sure.

This sounds like a minor hardware fault. It may be that you've developed a bad memory byte or that the disc controller chip is faulty. On the other hand it could be power surges demanded by the disc drive if this is powered from your micro or there's insufficient ooomph on the data bus driver.

Try changing the 74LS245 (IC14) for the ALS version of the same chip.

Keyboard crash

MY system comprises an issue 7 BBC Micro in a Solidisk metal case with separate keyboard connected by a short ribbon cable. The problem is this: All my rom-based and business software works perfectly, but whenever I try to hyperspace in Elite the machine locks up and only Break works

The same occurs on all my game discs, but only when the machine is hot. If I play from cold the games work for about an hour and a half and then the machine locks up.

I have replaced the Video ULA and the two VIAs. All the connectors and cables have been cleaned and all removable chips removed and replaced with no bent pins. – **E. B. Locke, St. Johns, Surrey.**

● *Your problem is the ribbon cable. Your normal programs run because they use the operating system commands to access the keyboard and even when hot they can obviously just about hang on and get the data.*

But games usually by-pass these routines in order to increase speed and in doing so pass the limits of successful operation and simply fall over and die. You could try a cooling fan, but I suspect you may have to revert to a keyboard attached normally. The same problem can occur when using the Viglen three box console.

Disc copying dilemma

NO doubt countless people have asked you this before, but is it possible to copy data from Master Compact 3.5in discs to Model B 5.25in discs, and vice versa? – **Joe Holmberg, Charlbury, Oxfordshire.**

● *There are several possibililties, but all except one require connecting either a 5.25in disc drive to your Compact or a 3.5in drive to a Master.*

The Compact Welcome disc should contain a DFS rom image. With this loaded and with a 5.25in drive connected you can load a file on ADFS, switch the drive and filing system, then save to DFS disc. The Master has both filing systems in rom so you can use the same procedure with a 3.5in disc connected. It is possible to load a file, physically unplug the 3.5in

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drive and insert the 5.25in one. The final option is to connect the two machines via their serial ports. File data can be transferred with these two simple programs:

```
 10 REM Transmit
 20 *FX7 7
 30 *FX8 7
 40 INPUT"File to send",f$
 50 Z%=OPENIN f$
 60 PRINT"Press a key...";
 70 REPEAT UNTIL GET
 80 REPEAT:*FX3,7
 90 VDU BGET#Z%:*FX3,0
100 UNTIL EOF#Z%
110 CLOSE#Z%:END
```

```
 10 REM Receive
 20 *FX7 7
 30 *FX8 7
 40 INPUT"File to receive",f$
 50 Z%=OPENOUT f$
 60 PRINT"Press a key...";
 70 REPEAT UNTIL GET
 80 REPEAT:*FX2,1
 90 BPUT#Z%,GET:*FX2,2
100 UNTIL EOF#Z%
110 CLOSE#Z%:END
```

Colour Chameleon

RECENTLY I bought a medium resolution monitor labelled Acorn AKF12 which I believe is a Phillips 8833. The monitor has two inputs, the normal TTL RGB input and a Euroconnector.

The specification says 16 colours are available from the former and all from the latter. Does this mean it's analogue RGB?

I would like to use the monitor with your Chameleon board. Is it compatible? – T. Searle, Seaforth, Liverpool.

● *The AKF12 is an analogue monitor and is completely compatible with the Chameleon as long as you feed it into the Euroconnector input, which is also known as a Scart socket.*

Terminal troubles

I OWN a BBC B and a Sony Viewdata Terminal, KTX-1420UB. The manual for the terminal says that it can act as a monitor using the RGB Multi Input which is located on the side of the unit.

The pin description for this is:

Pin	Signal	Signal Level
1, 2	+5v	500mA
4-17	Gnd	
19	+12v	200mA
20	Audio (R) input	726mV rms, 47kΩ
21-23	Gnd	
24	Audio (L) input	726mV rms, 47kΩ
25	Red input	Positive polarity, 0.7v, 75Ω, non sync.
26	Green input	Positive polarity, 0.7v, 75Ω, non sync.
27	Blue input	Positive polarity, 0.7v, 75Ω, non sync.
29	Blanking	Positive polarity, 1-3v, 75Ω terminated
30	Composite sync	1v, 75Ω terminated, negative.

What I'd like to know is how to connect this to my BBC Micro. Can I connect the outputs on my RGB socket directly to those on the terminal? Where can I get the 12v and blanking inputs from?

There's also a fault in the micro which occurs when I switch on: The speaker emits a noise like an untuned radio which eventually fades to a crackle and then goes completely. Although no other problems have appeared I'm worried that the machine will crash at some crucial moment. – **Nic Rutterford, Ashurst Wood, West Sussex.**

● *You can certainly try direct connection – the voltages that your micro produces are higher than those specified, but they won't damage the terminal. The worst that could happen is that you would get poor quality.*

Use pin 30 for the sync input and 24-26 for the RGB – and don't forget the ground. The blanking input (pin 29) should be connected to pin 1.

The 12v and 5v pins are not inputs but power supply outputs from the monitor. If the monitor complains that the input signals are too high you'll have to "pad them down". This can be done using an 150Ω resistor in series with each connection (RGB and sync) and a 75Ω resistor on each monitor input to ground.

As to your speaker problem, it sounds as though it is picking up the interference usually generated by the micro. This could be due to the proximity of a rom extension cable to the speaker leads.

However crackling indicates an intermittent fault, so make sure all the power leads are tight on their connectors – especially the single purple one on the left-hand side.

Masterising a Beeb

I WOULD like to upgrade my Model B so that I can run the Master versions of Elite and Lancelot. What do I need? – **Jonathan Beeston, Stoke-on-Trent.**

● *When considering this type of upgrade you have to look at the differences between the machines:*

First there's the central processor itself. In the Model B this is a 6502, but in the Master it's a 65C02 with an extended instruction set – some games are re-written to use the extra instructions. These chips are quite cheap and a simple replacement will suffice in most machines except the very old ones.

Shadow screen is the next addition and plenty of commercial boards achieve this. In the Master you can independently switch between access and display on each of the two banks of screen ram, whereas on an expanded Model B you can only switch the display – Master Elite requires access switching. Sideways ram banks can be added easily and many games will detect and use them.

The Master has so-called private ram so that filing systems don't have to grab main memory for their workspace. This cannot be implemented easily on the Model B, and even if it was the software is not designed to recognise it.

The final step is the extended system commands available in the MOS. Some third party roms provide these to work in association with extra hardware to provide compatibility, but none can be 100 per cent successful.

As you can see, while it isn't an easy job a fair amount of compatibility can be achieved.

Master on the move

I WILL be moving to Canada this year and want to take my Master with me. What do I need to do to make the micro, printer, disc drive and TV – I don't have a monitor – compatible? – **Colin Trenchard, Shaftesbury, Dorset.**

● *The safest way to make the change is to use a step-up transformer to alter the Canadian mains from 110 volts to the 240 volts used by your equipment.*

The main problem lies with your TV set. You can use the step-up transformer to drive it, but the line and frame frequencies are different in Canada and although you'll probably be able to get a mono picture you won't have colour.

A Canadian TV set uses NTSC to produce colour whereas we use PAL so you'll also only get mono if you try to use your micro with a Canadian TV.

I haven't tried it, but you could try converting your micro to NTSC by replacing the colour sub-carrier crystal X2, 17.73 MHz with a 14.31818MHz one.

Then you'd need to disconnect pin 12 from IC48 – this alternates the phase of the colour signal every line, which is the main difference between the systems. Finally, for best results you could reprogram the video controller IC2 (6845) to give you the exact line and frame frequencies required.

An alternate method that I wouldn't recommend is to check each item of equipment to see if the input transformer has a 110 volt tap. There is one on the Master and there may be one on the other equipment. However tampering with these could lead to disaster if you're not an expert.

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Curbing the current

THE
BEEB
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Mike Cook shows how to use mains electricity safely

THE raw power of mains electricity is normally kept well out of the way of computers. However there are occasions when it needs to be tamed. I had to do just that recently in connection with some other work, so I thought I'd share with you the tricks of how it's done – safely.

Many devices use mains electricity and are suitable for one of the two types of control – on/off and proportional. Whereas all devices are suitable candidates for on/off only a few are suitable for proportional, and these include electric heaters, motors and lights.

Devices unsuitable for proportional control include washing machines, TV sets and computers. You see, what is the point of only half turning on a TV set – unless you only want to half-watch a program!

I did cover on/off control way back in the September '83 Body Build article, so now I think it's high time I dealt with proportional control.

Conventionally, if we want to limit the power in a device we include a series resistor, and if it needs to be variable control, we use a variable resistor. For high power mains devices such as theatre lights this takes a physically big resistor which gets very hot.

I well remember the 3ft long dimmers I used in many old theatres and dance halls, the smell of cooking dust and grime generated by the heat.

You see, what a series resistor is doing is soaking up the extra power which is not being delivered into the device. However there is a better way to limit a device's power without wasting the energy and that is by using an SCR or, to give it its other name, a thyristor.

SCR stands for Silicon Controlled Rectifier and its name tells you what it does. Basically it is a rectifier, that means that it will pass current in only one direction, but it is controlled in the sense that it will not begin to pass current until it is given a small trigger pulse. This trigger pulse to the gate connection "turns on" the SCR and allows it to conduct.

Once conducting, the only way to turn it off is to reduce the voltage across it or current through it to a very small value. This value is so close to zero that it is not normally worth worrying about the difference.

Now you might think that an SCR is great for turning things on but not off. This is true when you are dealing with direct current (DC) but when you have alternating current (AC) the voltage drops to zero twice every cycle. Figure I shows a cycle of alternating current – for half the cycle it is positive and for the other half negative.

So if we use a single SCR it will only pass half the cycle and so run our load at only half power. This is because it is only on half the time, which gives a clue as to how we can proportionally control a device. If we restrict the time we apply the mains then we will also restrict the power to it.

What we need to do is to connect up our device or load with an SCR in series and generate a small trigger pulse every half cycle. This pulse will turn on the SCR and pass current into our load for the rest of the

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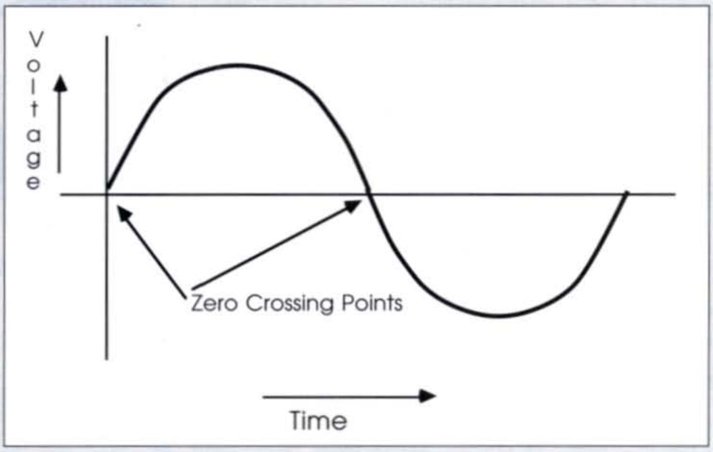

Figure I: A cycle of AC

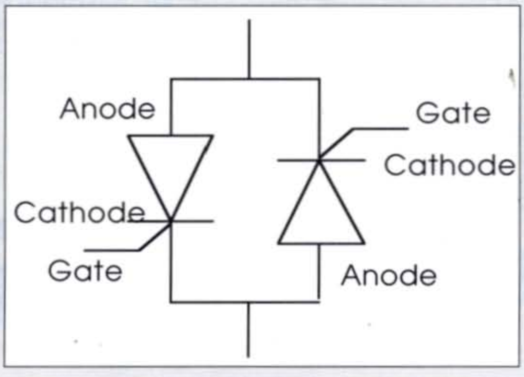

Figure II: Current flow in both directions by using inverse parallel SCRs

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half cycle. When the voltage reverses the SCR will be turned off until triggered again.

The secret of control is to delay the triggering pulse until part of the cycle has passed and only turn on the SCR for the remainder of the cycle. In this way, altering the pulse's delay alters the power in our load. As an SCR will conduct only in one direction, to be able to power our load on both halves of the cycle we need two SCRs connected in what is known as inverse parallel. This is shown in Figure II.

So to control the power in a device fully we simply need to control the timing of two small pulses. This is known as phase angle control because the time "into" a sine wave can be envisaged as an angle of rotation. Figure III shows the shaded part of the AC cycle is the only time power is applied to the device. As our delay gets shorter the power to the device is increased. Finally if the delay is zero the device is fully on.

We could generate this delay directly with our computer, but there are snags in doing it this way: For a start the pulses have to be synchronised with the mains frequency, and secondly it eats up a lot of computing time defining a precise delay 100 times a second.

However it is such a common problem that there are many commercial phase angle control modules available. These have the advantage of fully isolating the control circuitry from the SCRs – needed in case of a failure in the SCRs resulting in high voltages appearing on the gate terminals. This could then get into your computer and blow every chip in sight.

Isolation is achieved either by the use of
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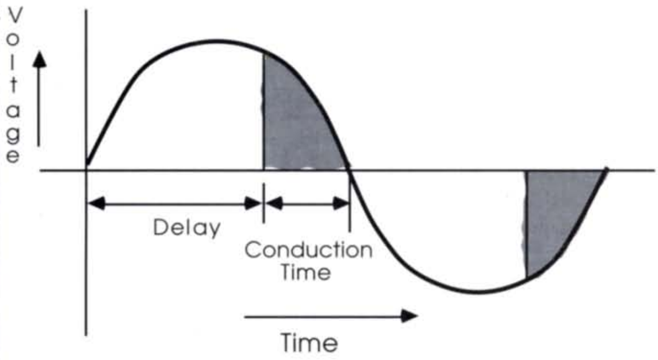

Figure III: Proportional control using phase angle switching

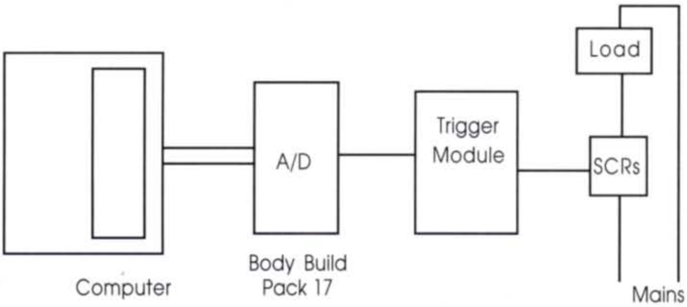

Figure IV: Block diagram of the control system

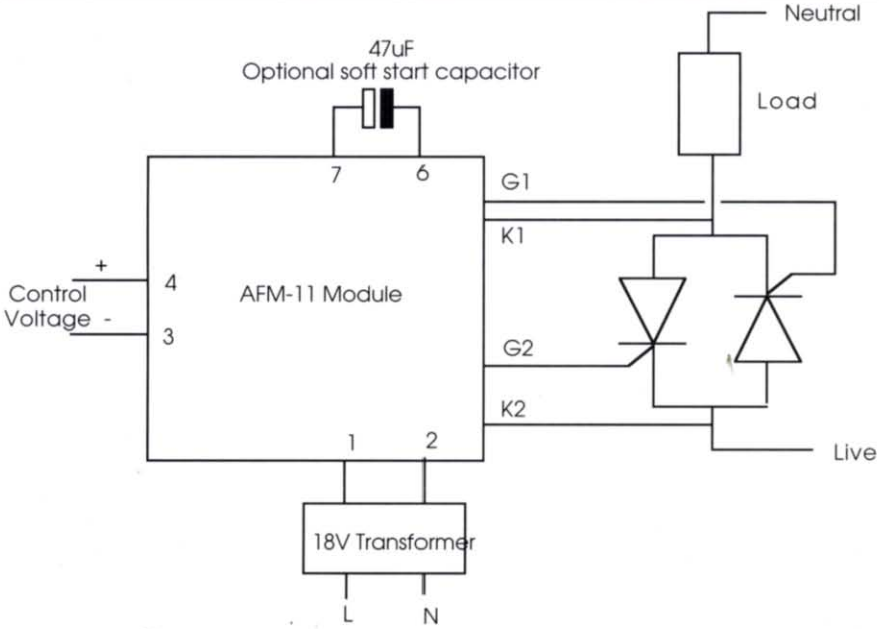

Figure V: APM 11 module wiring

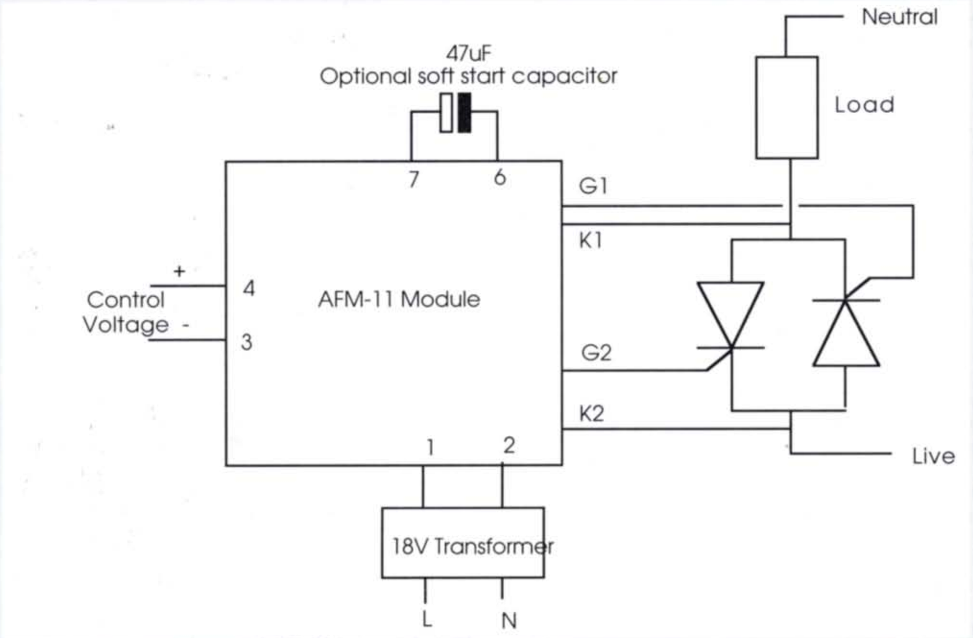

Figure IV: PCT module wiring

➤

a pulse transformer or opto-isolator which ensures that whatever disaster occurs the control circuitry is safe. Controllers of this type require something in the region of 0 to 5 volts to effect full control from fully off to fully on.

Fortunately we have a way of producing this voltage easily from our computer by using Body Building Pack No.17, the D/A converter. This was described in the October '84 *Micro User*, and is still available. More recently, from August 88 to May 89 the Experimenter's board (Pack 50) also contained a D/A converter.

Therefore we need three components to make up a proportional system, D/A converter, phase angle trigger module and the SCRs, these are shown in Figure IV. I would recommend two different types of trigger module, the AFM-11 from United Automation and the PCT 245 from Semikron. Essentially they do the same job but are sufficiently different to make one more convenient than the other, depending upon your needs. The wiring is shown in Figures V and VI.

The PCT 245 has a built-in power supply transformer and provides optical isolation, but is more expensive. Connections to it are from push-on crimped spade connectors supplied.

The AFM-11 and its connections are by screw terminals. It requires an 18 volt supply from an external transformer for the module's power and pulse synchronisation.

However this module provides some extras – the range or span and zero can be controlled using built-in 10 turn potentiometers.

This means that you can adjust the module to the exact range of voltages of your control D/A. In addition there is an optional soft start input. By placing a capacitor here, say 50uF at 30 volts, you can restrict the maximum rate at which the power will change; this is like adding a delay.

Both modules are sealed units and will power SCRs with ratings from 1A to 1,000A so you are best getting the SCRs to suit your needs.

Remember that a device controlled in this way is never "off", in the conventional sense of the word, it is only powered down. Due to the leakage currents in the SCRs you can always get a shock if you touch the mains through an "otherwise off" SCR.

Leakage current also reduces the minimum load that you can switch. Anything drawing less than 100mA or dissipating 2.4 watts is going to be difficult to control.

Devices suitable for such control are heaters, floodlights and motors. In fact anything where you wish to turn down the power.

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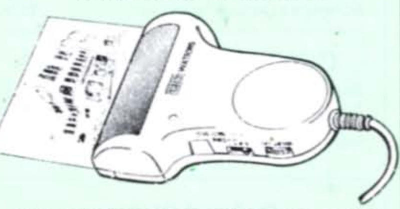
Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system. The package includes the most comprehensive utility software available for the Archimedes, a high quality, ergonomically designed to fit the shape of your hand, (see drawing above) scanner, which is fitted with a warning LED that will indicate if the scanner is being moved too quickly for accurate results. Additional twin guide rollers ensure precise tracking over the image, to make the best use of the high resolution available with this sytem. The yellow/amber illumination of our Mk II scanner, enables you to achieve optimum accuracy. It is capable of scanning upto an amazing 400 DPI. The scanning area is 4" wide and the height is only limited by the maximu amount of memory available.

On board ROM software supplied, is the most sophisticated Archimedes scanner software yet written.

AHS-4	**Archi 300/400 Version**	**£149**
AHS-3	**Archi A3000 Version**	**£175**

Z88 Portable Micro

Only: **£195** (Carr £4)

FREE

With every Z88 purchased from us, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

ACCESSORIES

● 32K RAM Pack or 32K EPROM Pack			£18.00
● 128K RAM Pack or 128K EPROM Pack			£45
● 512K RAM Pack			£175
● Z88 Eprom Eraser Unit			£35
● Z88 Spellmaster for Pipedream			£51
● Z88 Carrying Case			£9
● Z88 Computing Book			£9.95
● AA Nicad Rechargeable Battery			£1.50
● Battery Charger Compact & Fast			£6
● Z88 Serial Printer Cable			£9
● Z88 Parallel Printer Cable			£25
● Z88 to Archi Link			£15
● Z88 to BBC Link	£20	● Z BASE	£56
● Z88 to PC Link II	£30	● Z TAPE	£42
● Z88 to Macintosh	£52	● Z TERM	£42
● Z88 Mains Adaptor	£9	● Z88 Modem	£149

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

By popular demand, we are now supplying refurbished and fully guaranteed BBC Micros with Disc Filing System

(Please telephone for price & availability)

ULTIMUM – Archimedes A3000 Podule Racking System

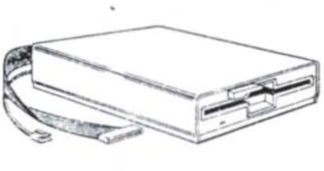
When Acorn originally designed the Archimedes micro, they released to all interested parties the specification of the expansion podule. This has now become the accepted standard for all manufacturers of Archi peripherals. The A300 & A400 both allowed expansion internally up to 2 or 4 podules. However, a newcomer to the affray has caused some upset. A3000 has only a single podule expansion slot, on the outside. There has been deliberation in the industry about a controversial "mini-podule" to be fitted to a special rack. This would entail a re-design of all the available podules onto a smaller board and understandably the manufacturers have rejected the idea completely. As always, Watford have come up with the only real solution to the A3000 expansion problem. The Ultimum Podule Racking System allows up to 3 full size standard A300/A400 series podules to be fitted to the computer. There is also provision for a hard disc drive and podule. Ultimum has its own PSU. There is also an IEC mains output socket for a monitor. It mounts on top at the rear of the computer, and allows direct access to the floppy drive and reset button, rather than obstructing access as on other non standard systems.

Watch this space for launch details.

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) £399*(carr £7)*

FREE OFFER



A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control.

FREE with every BBC Master purchased from us during July

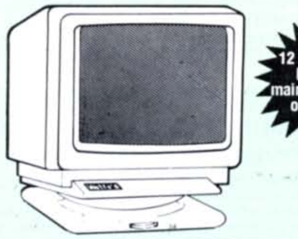
ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module			£115
Econet Module for the Master			£47
Twin ROM Cartridge for Master			£9
Quad ROM Cartridge for Master			£14
Master Reference Manual I		(No VAT)	£14
Master Reference Manual II		(No VAT)	£14
Master Advance Ref Manual		(No VAT)	£17
64K Upgrade Kit for B+			£32
Acorn 1772 DFS Kit complete			£49
ECONET Upgrade Kit for BBC B			£42
ALL ECONET UPGRADES Available			
ARIES' IEEE Interface for BBC B & Master			£238
Morley Teletext Adaptor with ATS Rom			£99
Filestore E01S	£899	Filestore E40s	£749
Filestore E60S	£949	Ecolink	£270

(Carr. £2 to £7 depending on the weight)

Continued→ → → → → → → → →

MONITORS



12 months FREE maintenance on site

MICROVITEC 14"

● **1431** – Standard resolution as used on the BBC television computer programme	**£175**
● **1451** – Medium resolution, suitable for word processing in mode 0	**£219**
● Cub3000 Medium Res for A3000	**£195**
● **1455** – MS Medium resolution, ideal for Archimedes	**£220**
● **1441** – High res, exceeds the capabilities of the BBC Micro	**£359**
● **1431AP** RGB + PAL and AUDIO	**£199**
● **1451AP** RGB + PAL and AUDIO	**£255**
● **2030 CS** 20" Med Res	**£380**
● **2040 CS** 20" Hi Res	**£675**
● Dust Cover for Microvitecs	**£5.50**
● **Touchtec 501 Touch Screen**	**£239**

14" MULTISCAN COLOUR

● **TAXAN** 775 Plus – 0.28 Dot pitch Ultra high resolution, anti-static screen	**£399**
● **TAXAN** 770 LR Low Radiation, auto-scanning Ultra High Res	**£429**
● **TAXAN** Multiscan 870 16" Monitor	**£575**
● **EIZO** 8060H – For technical info. read the review in Micro User, Jan. '89	**£389**
● **EIZO** 9060SZ Low Radiation, Super High Resolution, Antistatic screen, multiscan monitor for a wide range of applications. 800 dots x 600 lines. Display for high res VGA. 0.28 Dot pitch	**£469**

- **TAXAN** Super Vision 3 – High Res 12" Colour Monitor/with green screen switch for wordprocessing
  Special Offer **£179** (While stocks last)

PHILIPS

● **BM7502** 12" Hi-res Green Monitor	**£70**
● **BM7522** 12" Hi-res Amber Monitor	**£71**
● **CM8833** 14" Med. Res Colour Monitor	**£215**

STAR BUY

- **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor . A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £189

- **PHILIPS 14"** Refurbished monitor, same as above at a special offer price Only **£120**
  (Offer valid while stocks last)

Dust Cover for Philips Monitors **£6**

(Securicor carriage on Monitors £7)

SWIVEL BASES

By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing at the top), you can easily adjust the viewing angle.

for 12" Monitors **£8** (carr. £2.50)

for 14" Monitors **£12** (carr. £2.50)

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

£12

SPARE LEADS

BNC Lead for Zenith or Philips	**£3**
Skart Monitor Lead	**£5**
RGB lead for TAXAN Monitors	**£3**
Archimedes Colour Monitor Lead	**£7.50**

CONCEPT KEYBOARDS

Standard A3 Keyboard with BBC Software	**£143**
Standard A4 Keyboard with BBC Software	**£117**
Archi A3 Keyboard	**£144**
Archi A4 Keyboard	**£118**

Roland Plotters

(Official Roland Appointed Distributor)

● **DPX 2500**	**£2495**	● **DXY 1100**	**£595**
● **DXY 1200**	**£835**	● **DXY 1300**	**£1015**

Panasonic KX-P1081

12 MONTHS FREE MAINTENANCE ON SITE

SALE OFFER only: **£127**

(Price includes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every KX-P1081 printer purchased from us)

KX-P1180 Printer Offer

Panasonic KX-P1180 printer, Dump Out 3, Screen Dump ROM & a BBC printer lead.

Offer Price £136

Panasonic Printers

● **KX-P1124** 24pin 80col. 192/63 CPS	**£215**
● **KX-P1540** 24pin 136col. 240/80 CPS	**£415**
● **KX-P1592** 9pin 136col. 216/45 CPS	**£275**
● **KX-P1595** 9pin 136col. 288/61 CPS	**£345**
● **KX-P1624** 24pin 132col. 192/63 CPS	**£349**
● **KX-P1695** 9pin 132col. 330/86 CPS	**£349**
● **KX-P4420** NEW 8PPM Laser Launch Offer	**£949**

- **Panasonic KX-P4450i** LASER PRINTER
  Latest technology at Watford's special offer price **£1,225**

● Spare Toner	**£29**	● A4 Feeder	**£55**
● Drum Unit	**£149**	● Developer	**£115**
● 1MB RAM Upgrade			**£299**
● 2MB RAM Upgrade			**£585**

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32)	**£175**	KX-P1540 (P35)	**£175**
KX-P1124 (P36)	**£85**	KX-P1180 (P37)	**£79**

BUFFERS

P12	4K buffer Board for 1081	**£55**
P42	32K buffer Chip for 1592/1595	**£16**
P43	32K Buffer Chip for 1540/1124/1180	**£16**

Serial Interfaces

P17 P1081/1592	**£32**	**P19** P1124/1180	**£55**

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595	**£8**
P115 for KX-P1180	**£8**
P145 for KX-P1124	**£8**
P140 for KX-P1540	**£10**
Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red	**£9.95 each**

INTEGREX COLOUR JET

● Colour Jet 132 Printer	**£515**
● Paper Roll	**£6.50**
● Screen Dump Software	**£10**
● Colour Cartridge	**£19.50**
● Black Cartridge	**£11.25**
● 100 A4 OHP transparencies	**£55**
● 8K Serial Interface Optional	**£123**

Citizen Printer Swift 24 £249

NEC PINWRITER P6/P7 Plus

NEC P6+ 80 columns	**£439**	**NEC P7+** 136 columns	**£575**
Colour Option	**£74**	Serial Interface	**£73**
Cut Sheet Feeder	**£125**		
NEC Ribbons for		P6 **£8;**	P7 **£9.50**

Hewlett-Packard Printers

HP Desk Jet +	£549
HP Desk Jet Cartridge	£20
HP Desk Writer	£669
HP LaserJet Series IIP	£845
HP LaserJet Series III	£1235
HP Laserjet IID	£845
HP Paint Jet Colour	£699
HP Quiet Jet Plus	£425
HP Scanjet Plus	£1199
HP Thinkjet	£269
Laserjet II TONER	£85
Series II 1 Meg RAM	£199
Series II 2 Meg RAM	£399
Series IIP 1 Meg RAM	£215
Series IIP 2 Meg RAM	£449

Star Printers

LC10 Printer	**£129**	XB24-10 r	£379
LC10 Mk II	**£160**	XB24-15	£499
LC10 Colour	**£168**	XB Colour Kit	£35
LC15	**£259**	LP8 II Laser	£1175
LC24-10	**£199**	LP8 IIT Laser	£1599
LC24-15	**£325**	Starscript	£1799
LP8 Laser	**£1199**		

Cut Sheet Feeder

LC10/LC24-10	**£65**	LC15/LC24-15	£125
XB24-10	**£80**	XB24-15	£139

EPSON PRINTERS

EX800	**£429**	LQ860 Colour	£535
EX1000	**£564**	LQ1050	£540
FX850	**£315**	LQ1060	£649
FX1050	**£385**	LQ2550+	£899
FX1060	**£679**	LX400	£129
GQ5000 Laser	**£975**	LX850	£179
LQ400	**£198**	SQ850	£515
LQ850	**£439**	SQ2550	£869
LQ550	**£269**		

CUT SHEET FEEDERS for

EX800/FX800/850/LQ800/850	**£130**
FX1000/LQ1000/1050	**£175**
LQ2550	**£390**
LX400/800/850/LQ400/500/550	**£69**

TRACTOR FEED for

LQ800 **£44;** LQ850/FX850 **£69;** LQ1050/FX1050 **£85;** LQ2500 **£90;** LQ2550 **£90.**

ACCESSORIES

● EX800/1000 Colour Option	**£45**
● EX800/1000 Colour Ribbon	**£14**
● LQ2500 Colour Option	**£65**
● Multifont Card for LQ550/850/1050	**£95**

(Securicor Carriage on Printers £7)

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer

RS232	**£32**	RS232 + 2K Buffer	£52
IEEE 488	**£40**	RS232 + 8K Buffer	£79

PRINTER LEADS

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 6'	£6
Nimbus Centronics Lead	£6
IBM Parallel Lead 6'	£6
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.

Listing Paper (Perforated)

● 1,000 Sheets 9.5" x 11" Fanfold Paper	£7
● 2,000 Sheets 9.5" x 11" Fanfold Paper	£11
● 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold	£21
● 1,000 Sheets 15" x 11" Fanfold Paper	£9
● 1,000 Sheets true A4 Fanfold Paper 70gms	£11
● 2,000 Sheets true A4 Fanfold Paper 70gms	£21
● Teleprinter Roll (Econo paper)	£4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

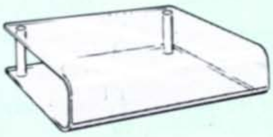
PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£5.00
1,000 90 x 36mm (Twin Row)	£4.90
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.25

Carriage on 1,000 Labels £1.00

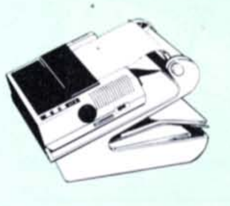
Perspex Printer Stand



Give you Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version	**£16** (carr £3)
136 Column version	**£20** (carr £4)

Professional Printer Stand



The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergonomic design ensures smooth paper flow and automatic refolding.

80 Column version £28 (carr. £3)
132 Column version £30 (carr. £4)

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
Brother HR15/20	£3.00	–
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£3.95	£4.50
DMP2000	£3.75	£4.75
EX/LQ800	£4.50	£4.50
EX/LQ1000	£6.75	£5.00
RX/FX80/85/800/MX80	£3.25	–
FX/MX/RX100/1000	£5.00	–
Kaga/Taxan KP810/815	£4.90	£5.00
LQ500/550/800/850	£4.50	£6.00
LQ1050/LQ2500	£7.00	–
LX80/86/800/850	£3.25	£4.50
M1009/GLP	£3.80	£3.75
NEC P2200	£6.00	£5.00
Panasonic KX1080/81	£3.50	£4.75
Panasonic KX-1124	£8.00	£5.00
SQ2500	£23.00	£5.50
Star LC10/NL10	£4.25	£5.00
Star LC24-10	£5.00	£6.00
Olivetti Ink Jet Cartridges (set of 4)	£9	

Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Universal Printer Sharers/Changer

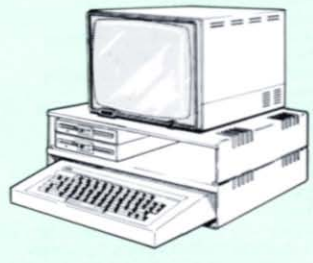
Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	Serial	Centronics	P&P
2 to 1	£20	£22	£3
3 to 1	£27	£30	£3
5 to 1	£36	£39	£4

(Cables extra at £6 each. Please specify type required when ordering)

PLINTHS FOR BBC MICRO, MASTER & PRINTERS



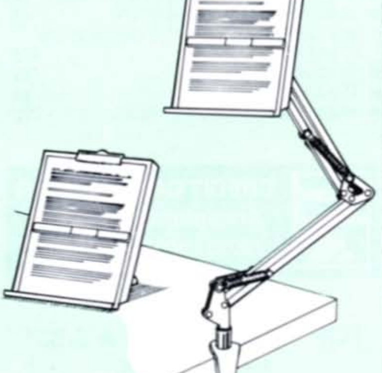
Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

Single BBC Plinth	420 x 310 x 105mm	**£13**
Double BBC Plinth	420 x 310 x 210mm	**£24**
Printer Plinth	420 x 310 x 105mm	**£12**
Single Master Plinth	490 x 310 x 105mm	**£14**
Double Master Plinth	490 x 310 x 210mm	**£26**

(Carr. Single plinth £2; double plinth £3)

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding you paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)
Angle poise **£12** (carr. £3)

Handy Printer Switch

A handy two way compact printer switch that enables you to connect 2 Micros to 1 printer, or 2 printers to 1 Micro. Attaches easily to your printer, monitor, etc. A low cost solution for educational establishments. Ideal for those wishing to use a dot matrix and a laser printer. Available in two configurations.

Compact AB Switch Centronics	**£19**
Compact AB Switch RS232	**£18**

(Cables extra at £6 each)

MEGABUFFER 256

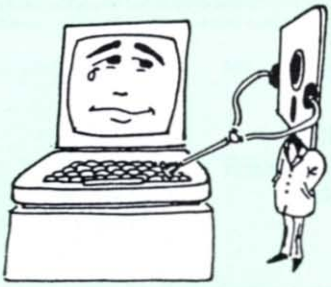
The Smallest 256K Printer Buffer Unit in the world **38mm x 130mm x 134mm.**

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. The features are:

- Improves efficiency by making more efficient use of computer and printer..
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatiblity with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in text unit for both the buffer & your printer.

Only £119 (carr £5)

DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

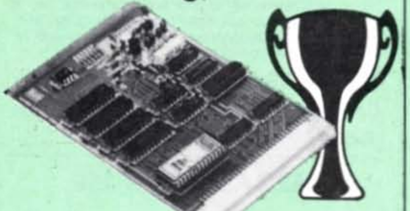
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

(Only suitable for BBC B with 8271 DFS)

Continued→ → → → → → → → →

Archimedes Real-Time Digitiser



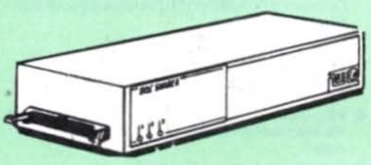
Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £215

A Set of Colour Filters for colour image grabbing using a video camera	£16
New Risc-OS Software Upgrade	£39

DISC DRIVE SHARER

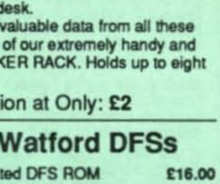


(Ideal for educational establishments)

At last, a low cost alternative to the Econet system.Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Offer Price : **£55** Price includes 3 Cables

DISC PLONKER RACK



When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the harzards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: **£2**

Acorn & Watford DFSs

Watford sophisticated DFS ROM	£16.00
Watford DFS Kit complete	£69.00
We will exchange your existing ROM for Watford's ultimate DFS ROM at only	£12.00
DFS Manual (comprehensive)	£6.95
Acorn DNFS ROM	£17.00
Acorn ADFS ROM only	£25.00
Acorn 1772 DFS ROM Kit	£49.00

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our **MkII** version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£39.00.**

SPECIAL PRICE	**£44.00**
DDFS Manual	(No VAT) **£6.95**
We will exchange your existing DFS Kit for our sophisticated DDFS for only	**£30.00**

Please note, as the **MkII** DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

10 x 5.25" S/S D/D 40T (744)	*£5*
10 x 5.25" D/S D/D 40T (745)	*£7*
10 x 5.25" S/S D/D 80 Track (746)	*£8*
10 x 5.25" D/S D/D 80 Track (747)	*£9*
10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT	*£14*
10 x 3.25" S/S D/D 40/80 Track	*£9*
10 x 3.25" D/S D/D 40/80 Track	*£9*
10 x 3.5" Double Sided High Density	*£22*

FREE – 3M World Desk Clock

(with special promoted boxes)

Buy 5 x 3.5" 3M special promoted Disc boxes, or 10 x 5.25" 3M Disc boxes and qualify for the specially commissioned 3M World Desk Clock. (Offer valid while stocks last).

TOP QUALITY 3.5" & 5.25" DISKETTES

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

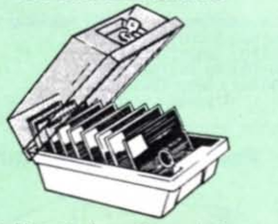
*10 x **M3** 3.5" D/S D/D 80 Track*	*£9*
*10 x **M9** 3.5" D/S High Density*	*£22*
*10 x **M4** 5.25" S/S D/D 40 Track*	*£5*
*10 x **M5** 5.25" D/S D/D 40 Track*	*£7*
*10 x **M7** 5.25" D/S D/D 80 Track*	*£9*
*10 x **M8** 5.25" D/S H/D Hi-Density*	*£13*
***M2** 3" Double Sided*	*£3 each*

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

ANTISTATIC LOCKABLE DISC STORAGE UNITS



Gives double protection – Strong plastic case that affords real protection to your discs.

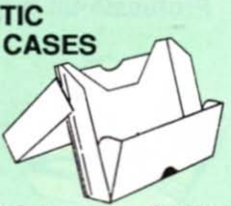
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.

Dividers and adhesive title strips are supplied for efficient filing of discs.

M35 – holds up to 50 5.25" discs	£4.95
M85 – holds up to 95 5.25" discs	£6.95
M25* – holds up to 25 3.5" discs	£4.95
M50 – holds 50 3.5" discs	£6.50
M10 – holds 8 of No. 10 Data Cartridges	£15

* Not lockable

PLASTIC LIBRARY CASES



Holds up to 10 5.25" Discs. Only £2.00

DUST COVERS (For our Disc Drives)

Single CLS (without PSU)	£3.20
Single CS (with PSU)	£3.25
Twin CLD (without PSU)	£3.85
Twin CD (with PSU)	£3.90

DISC ALBUMS

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Special BULK OFFER on 5.25" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

PRICES SLASHED

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
Without Sleeves	£30	£35	£40
With Sleeves	£33	£38	£43

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. *Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

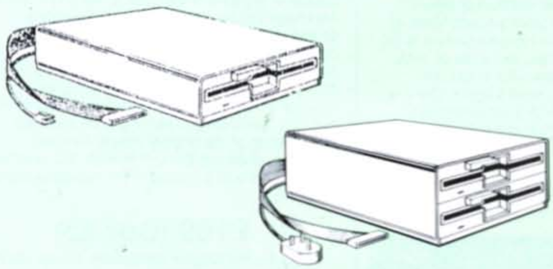
Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public. If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. ***Ideal for Schools & Colleges.*** *We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £18. (At Watford we anticipate your needs of tomorrow, not just today!)*

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 4th page of our advert for the Plinths).

P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415



"Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS400S £74		CS 400S £83	
800K (1,44M		CLD 800S £149		CD 800S £162

- TWIN Disc Drive Case, complete with Power Supply & Cables **£43**

Securicor carriage on Disc Drives £6 to £7

Prefix	***C** = Cased Drive*	*Suffix*	***S** = 40-80 Switchable*
	***L** = Less PSU*		
	***S** = Single*		
	***D** = Double*		

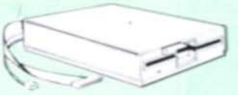
e.g. *CLS400S = Cased Disc Drive, Less power supply unit, single 5.25" 400K, (720K in double density); Double sided; 40/80 track switchable.*

Refurbished Disc Drives now available

CLS400S £50 CLD800S £98 CS400S £59 CD800S £115

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

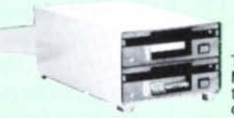
Special 40/80 Disc Drive/DDFS Mk II Offer



- The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both Single & Double Density modes.
- A comprehensive User Friendly Manual.

A Bargain at Only **£119** (£7 carr) (Offer valid while stocks last)

3.5" DISC DRIVE OFFER



These top quality 3.5" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

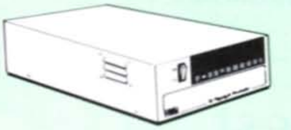
Drives to connect to BBC Micros own PSU

- **CLS35 400K Unit £65**
- **CLD35 Twin 800K £119**

Drives with built-in Power Supply Unit

- **CS35 Single 400K £85**
- **CD35 Twin 800K £129**

(P.S. CS35 Single is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage).



WATFORD's WINCHESTER DRIVES

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

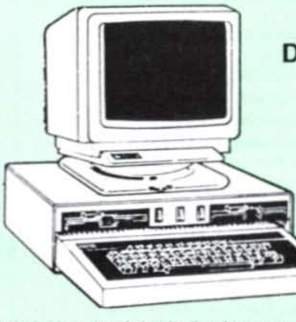
This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a Utilities Disc.

Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

Compatible with the Master, and the BBC B (with 17 X disc interface).

- 30 Megabyte BBC Hard Disc **£395** (carr £7)

CDPM 800S



DP35-800S

Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDPM 800S for the BBC B & Master £175

A Double disc drive with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master series is the 5.25" disk, the standard of the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S. It contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25" disc drive is 40/80 track switchable. DP35-800S has its own power supply, independent of the BBC Micro.

DP35-800S for BBC/Master £165

(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

Continued→ → → → → → → → →

QUEST MOUSE Mk II

● Quest Mouse II & Quest Paint	£58
● Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont	£89
● Quest Mouse II only	£29
● Quest Paint Software only	£34
● Quest Font Disc (22 Text Fonts)	£15
● Quest Mouse Mat (Red or Blue or Green please specify)	£3
● Part Exchange your unreliable AMX Mouse for a Quest Mouse for only	£22

(P.S. Quest Paint is not compatible with BBC Compact)

Winner of the BBC Acorn User 1990 Award for the Best Art/ Graphics software

ConQuest

Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

NEW

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £39

RB2 Marconi
TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75
RB2-A for Archimedes	£46

THE NEW Mk III AMX MOUSE

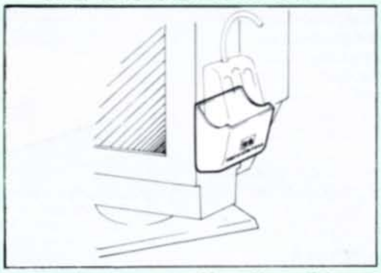
Inc. Super Art package

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

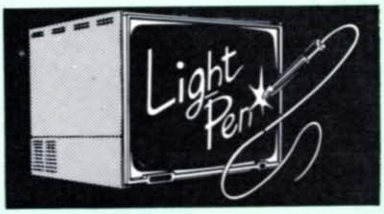
MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£20

WE MOUSE HOUSE



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk. It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.

Price £4



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Admin Xtra Disc Utility	£13
Walt Disney Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB VIDEO DIGITISER

"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional ★ commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image. Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £5)

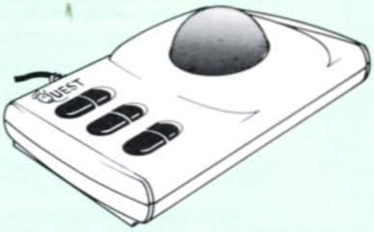
(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

NEW

QUEST – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version	**£32**
QT-20 Archimedes Version	**£35**

WAPPING
EDITOR
"MIGHTIER THAN THE QUILL"

Winner of the BBC Acorn User 1990 Award for the Best DTP/ Word Processor

The WAPPING EDITOR

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

PAGE LAYOUT SECTION

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module is a mode 0 version of the highly acclaimed Quest Paint package, and incorporates all the same drawing facilities, e.g. pencil, brush, airbrush, polygon, circle, ellipse, fill, cut-and-paste, etc., etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

WORD-PROCESSOR

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

cont./-

THE FONT EDITOR

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individully proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.
Upgrading to the Wapping Editor could not be easier since the font editor will convert fonts from other packages, such as Quest Paint or Stop Press (formerly Pagemaker), into Wapping Editor format and a mode conversion utility will convert any screen in modes 1, 2, 4 or 5 into a full grey-scale mode 0 screen. Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser, either independantly or from within the Wapping Editor package.

Wapping Editor Software Pack	**£69**
Wapping Editor plus Mouse	**£89**

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

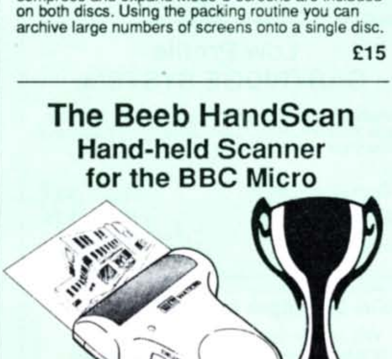
There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

The Beeb HandScan

Hand-held Scanner for the BBC Micro



Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware	£135

Wapping Font Disc

Sixteen Wapping Editor fonts including smaller versions of Oberon and Daisy and two new sizes of the standard font.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

£12

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

NEW

Laser Direct

For Archimedes Micro

By using the power of the Archimedes RISC processor, it offers the best of both worlds – print speed up to 5 times faster than typical Laserjet compatibles – uses outline fonts so that any font can be scaled to any size – works with all programs that use RISC OS printer drivers. Ideal for use with Genesis, !Draw, Acorn DTP, Impression, etc. Includes 50 sheet paper tray and a single sheet/ envelope tray. Requires one expansion slot and at least a 2Mbyte Archimedes. A very compact printer, a very low initial cost and very low running costs.

Launch Offer: £949

(For demonstration, call in at our retail shop)

NEW

Beeb PC (BASIC)

Beeb PC Basic is designed for program authors wishing to convert programs so that they will run on IBM personal computers. To convert BBC BASIC programs manually can waste days of valuable time with every occurrence of common statements such as PROC, DEFPROC, TAB, having to be changed. Beeb PC (BASIC) automates many of these changes, and will convert majority of BBC statements that are invalid for IBM BASIC into equivalent acceptable statements. In addition BBC BASIC data files can be converted to IBM BASIC format, with support provided for all BBC data formats:- INTEGER, REAL & STRING.

Price: £38

NEW

Beeb DOS 2.2

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual.
(Will only work on 360K Disk Drives)

Price: £39

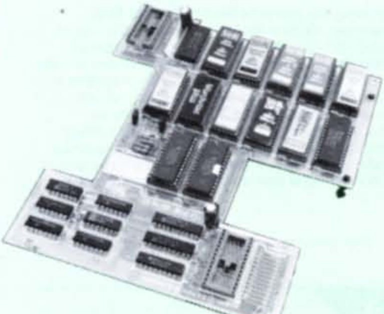
(Please write in for technical literature)

Continued→ → → → → → → → →

STAFF VACANCIES

Watford Electronics is the leading supplier in the Acorn computer field and has established itself in the PC compatible market with its Aries PC computers. In its eighteen year history, Watford has always kept itself at the forefront of the new technology. Due to our latest expansion, we require staff to man our BBC/Archimedes and PC Technical Departments. Applicants will be required to be familiar with BBC/ Archimedes hardware and software, and PC staff will need to be familiar with PC computer hardware. Good rates of pay, excellent prospects. Subsidised company accomodation is available to single persons if required. Telephone Keith Archer or Richard Overfield for interview, or write to us enclosing your CV.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

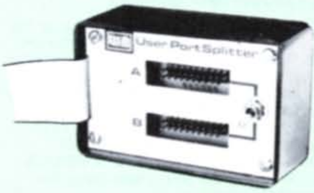
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8.50**
(carriage £3)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

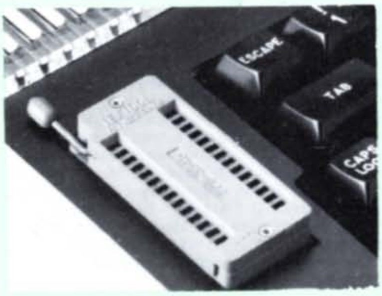
USER PORT SPLITTER UNIT



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

Sideways ROM ZIF Socket System



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£18** (carr £3)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System	**£11**
● Spare Cartridges	**£2.75**
● Spare Rack	**£1.65**

ROM Cartridges for the BBC Master

Will accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£9;** Quad **£14**

16K Disc Ram Module

(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.

Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional Battery back-up fitted	£3

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as th printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£59** (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:	Aries B-12	£36
	Aries B-12C	£5

ARIES B-488 IEEE-488 INTERFACE UNIT

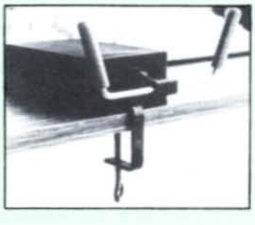
The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

VOLTMACE JOYSTICKS

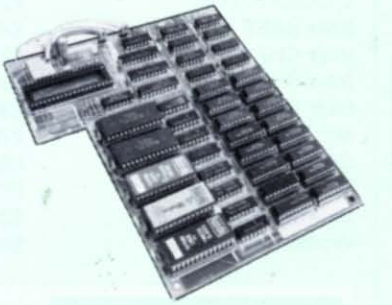
Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£15
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£11
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7
Delta-Cat A mouse eliminator Joystick for the Archimedes	£24

Delta Base B



Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128	£25

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 7 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

NTRODUCTORY PRICES:

● ROM/RAM card with 32k dynamic RAM	£48
● ROM/RAM card with 64k dynamic RAM	£65
● ROM/RAM card with a massive 128k dynamic RAM	£109

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

● 16k plug-in Static RAM kit	£9
● 16k Dynamic RAM for Upgrade	£13
● Battery backup	£3
● Read and Write protect switches	£2 each
Complete ROM-RAM board All options installed	£115

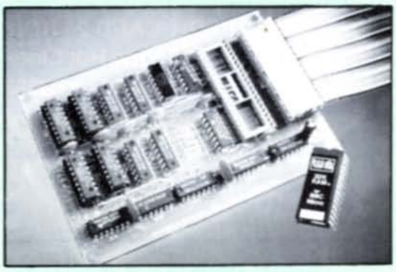
P.S.

IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K

SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

● IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

● "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

● In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.

● Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.

● Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

● Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £3)

(Price includes a comprehensive manual and the ROM)

Acorn Speech Synthesizer package complete, for the BBC B Microcomputer

Special Offer £18

Watford Electronics are:

- Acorn Qualified Dealer & Econet Referral Centre
- ARIES PC Dealer/Distributor
- Cambridge Computer Dealer
- Epson Silver Centre
- EIZO Monitor Dealer
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- NEC Appointed Dealer
- Panasonic Premier Dealer
- Roland Plotter Official Dealer
- Star Printer Sub Distributor
- Taxan Appointed Monitor Dealer
- 3M Media Premier Distributor

BBC SOFTWARE'S Popular Educational Software

● Maths with a Story 1 (Disc). 4 primary level maths programs	£11.25
● Maths with a Story 2 (Disc). 4 further maths programs.	£11.25
● Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs.	£17.00
● BONDING: Science (Disc) O-Level Chemistry program.	£20.00
● ELECTROMAGNETIC SPECTRUM (8 Discs) O-Level program.	£20.00
● ELECTRONICS IN ACTION (Disc) O-Level program.	£19.95
● NEWTON & THE SPACE SHUTTLE (Disc) O-Level program.	£20.00
● ECOLOGY (Disc) O-Level program.	£20.00
● POLYMERS (Disc) O-Level program.	£20.00
● Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule.	£20.00
● FOOD & POPULATION (Disc) O-Level program.	£20.00
● MICROTECHNOLOGY (Cassette) O-Level program.	£11.25
● DEUTSCH DIREKT! (Disc & Audio Cassette)	£19.95
● Modem Master (Disc)	£11.25
● ADVANCED TELETEXT SYSTEM	£8.65
● PERIOD TABLE SOFTWARE	£20.00
● Astronomy – Primary (Disc)	£12.00
● Computers at Work – Primary	£17.35
● Introducing Geography 11-17 years	£17.50
● Electric Fields 6-14 years	£11.25
● Black Queen Contract Bridge	£13.00
● Espana Viva – 3 Discs	£13.95

Educational Software

FUN SCHOOL 2 – Red.

Under 6 yrs – 8 programs on Discs, Shape Snap, Find the Mole, Teddy Count, Write a letter, Colour Train, Pick a Letter, Spell a Word & Teddy Bears Picnic. £12.00

FUN SCHOOL 2 – Green:

6-8 yrs – Eight programs on Disc, Number Train, Shopping, Maths Maze, Treasure Hunt, Bounce, Packing Caterpillar, 3 Number jump £12.25

FUN SCHOOL 2 – Blue:

Over 8 yrs – Eight programs on Disc, Build a Bridge, Passage of Guardians, Unicorn, Logic Doors, Souvenirs, Code Boxes, Mystery Machine & Escape. £12.50

● PUNCMAN Learning punctuation	
Puncman 1 & 2 for 7 – 13 years	£15
Puncman 3 & 4 for 8 – 14 years	£15
Puncman 5 & 6 for 8 – 15 years	£15
● Yes Chancellor – A chance to take over number 11 at Downing Street. 12 years+	£18
● Letters & Pictures – Introduces phonic skills to Infants 6-8 years	£15
Numbers & Pictures – Early number learning is a great fun (4-6 years)	£15
● Note Invaders – Budding musicians can learn the notes on the Clef with this elegant game 3 programs (7 to Adults)	£15
● Maps & landscapes No. 1 (9-14 years)	£18
● Help Your Child learn Basic Map work No. 2 (9-14 years)	£18
● Pirate – Educational Adventure (8-14 years)	£15
● Spelling Week by Week (6-14 years)	£18

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Continued→ → → → → → → → →

VIEW 3.0 ROM	**£45**
VIEW PROFESSIONAL	**£50**
VIEWSHEET (Acornsoft)	**£36**
VIEWSTORE	**£36**
VIEWSPELL with 80 track disc	**£25**
VIEWPLOT Disc (Please specify for Master 128 or Compact)	**£20**
VIEW-INDEX	**£12**
OVERVIEW packs 1 & 2	**£65**
HI-VIEW	**£38**

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8

OFFICE MASTER

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trial balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE

- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

MINI OFFICE II

DISC Version for BBC B & B+	**£14.00**
DISC Version for BBC Master	**£16.00**
DISC Version for the Compact	**£18.00**

(When ordering please specify for which Micro & 40 or 80 track Disc)

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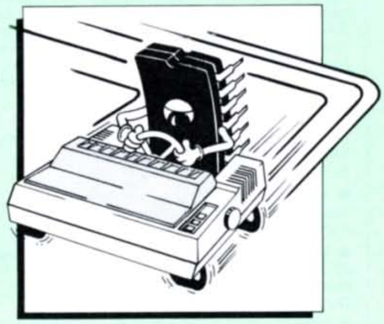
Ansaphone Hot Lines
(0923) 50234 or 33383

Advanced Computer Products

Advanced Disc Toolkit	£28
Advanced Disc Investigator	£24

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing at only a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips.

Price: Only £33

COMPUTER CONCEPT'S ROMS

COMMUNICATOR	**£49**
DISC DOCTOR	**£28**
Inter BASE	**£49**
Inter CHART	**£25**
Inter SHEET	**£37**
Inter WORD	**£36**
MEGA-3 ROM	**£76**
SPELL MASTER	**£42**
TERMI	**£25**
Wordwise	**£24**
Wordwise Plus	**£40**

Wordwise plus **£40**

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

BOOK

The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price £5.95 (No VAT)

Example programs on Disc £4.95

BOOKS (No VAT on Books)

15 Hr Wordprocessing BBC/View	£5.95
15 Hr Wordprocessing BBC/WW & WW+	£5.95
30 Hour BASIC (BBC Micro)	£12.95
Advanced User Guide for BBC	**£10.95**
Amiga Machine Lang. Guide	£19.95
Archimedes 1st Step – Beginners Guide	£9.95
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Archimedes Operating System	£14.95
Archimedes Risc-Os Programmers Reference Manual	£79.00
Arm Assembly Lang. Prog. Manual	£15
Assembly Language Prog. for the BBC	£10.95
Assembly Language Quick Ref.	£21.95
BASIC 2 – User Guide	£2
Basic V – A Dabhand Guide	£9.95
BBC Basic Guide (Archimedes)	£19.95
BBC Computer Handbook – The Complete	**£14.95**
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COMAL – Introduction to	£9.50
Deutsch Direkt! (Book only)	£5.95
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File Handling on BBC Micro	£8.50
FORTH on the BBC Micro	£9.95
Hackers Handbook – New	£9.95
Inside Information, Computers & Coms.	£9.95
ISO-PASOAL Reference Manual	£9.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
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Mastering Interpreters & Compilers	£14.95
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PASCAL Programming	£9.95
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The Software Business	£5.50
Understanding Interword – A Beginners Guide	£6.50
View 3.0 User Guide	£10
View Guide (View 2.1)	£5.00
View, Viewsheet & Viewstore – Mastering	£12.95
Viewsheet & Viewstore Dabhand Guide	£12.95
VIEW Dabhand Guide	£12.95
Viewsheet User Guide	£10
Viewstore User Guide	£10
Wordwise + A User Guide	£10.95
Z88 – A Dabhand Guide	£14.95
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1-2-3 Mastering Release 3	£22.95
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dBase IV – Using	£20.95
DBASE IV – Complete Ref	£27.95
Desk Top Publishing by Design	£18.95
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DOS – Programmers Ref. Manual 2nd Ed	£22.95
Excel IBM Version – Using the	£22.95
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Framework III – Mastering	£22.95
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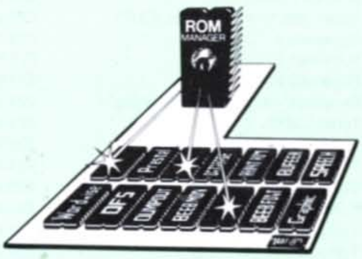

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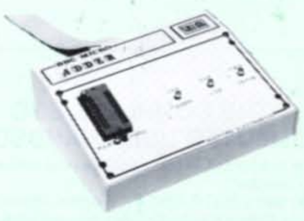

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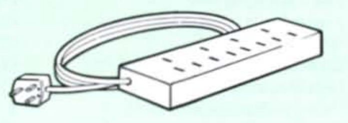

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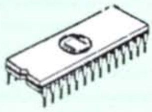

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Rob Anderson finishes off his ram board by adding the vital software interface

LAST month we took a look at the nuts and bolts of making a 32k memory board to connect to the 1MHz bus, along with a test routine to provide simple diagnostics to try and locate those inevitable dry solder joints.

HARDWARE is all very well, and owning a 32k ram board can be very nice, but without software it's just a pile of chips. So let's look at another program containing utilities which can be used to provide further tests and information that lets you write your own software.

Also – as promised – our monthly disc contains firmware residing in sideways ram to implement a silicon disc.

What makes a good test of ram? At first sight it would appear that simply reading and writing every location in the memory board would be enough – but, as usual, life is never that simple, and there are more subtle problems which often go unnoticed. For example, to test location &0001 we could execute this;

```
?&FCFF=0 :REM high byte
?&FD01=23 :REM write
PRINT ?&FD01
```

If the result is 23 we may conclude that that location is OK. However, suppose writing to that location has corrupted some other locations in the ram? This could happen if the address lines are not connected properly, so a more searching test is to write to a number of locations and then re-read them while comparing them to an independent record of the original values.

This presents a problem, because reserving 32k of main memory in which to keep a record is impossible on a machine with only 32k in total.

One way round this is to use a known sequence of numbers generated from a mathematical function. As we don't have to store them we can just recalculate from the start. A simple function would be to use incrementing values:

```
?&FCFF=0
FOR A%=0TO255
?(&FD00+A%)=A%
NEXT
```

This might not, however, detect an error such as D0 and A0 being connected the wrong way around, because the data lines and the low eight address lines are the same for each write.

A much better method is to use a function which generates pseudo random binary sequences – PRBSs. In fact, BBC Basic's RND function is ideal for this job because, once seeded with an initial value, it will generate the same sequence of random numbers every time. Program I uses this technique in procedure *prbs*. To demonstrate this, type it in, ensure you've made no errors using the checksums, save and run it and select menu option three.

Note that this performs two sets of tests – after writing a value it immediately reads it back as a primary test, but the secondary loop is more important as it ensures locations have maintained their values while other areas of the ram board have been accessed.

In fact, the first loop is only a very basic test because when writing to Jim the computer has stored the value in both Jim and the ram board, so an immediate read back would result in the correct answer, even if the ram board were not connected. This is why it is important to cross page boundaries to ensure that the ram board is placing values in Jim and that they are not just left

Firmware support

So far we have discussed how easy it is to access paged memory from Basic or machine code, but to increase the useability of the memory board a chip has been written to provide a number of high level routines to create a simple silicon disc which has commands similar to the DFS, but which operate on paged ram.

The file RamDisc on this month's subscription disc may be loaded into any 8k bank of sideways ram, or alternatively blown on to an 8k eprom.

This firmware is not a filing system in its own right, so its commands may be mixed freely with those of the currently active filing system.

Commands supported by RamDisc are listed in Table I and are analogous to some of the DFS ones. Before files can be stored the paged ram must be formatted using *PFORMAT, after which *PSAVE can be used to save a specified area of main memory to paged ram. Using:

```
*PSAVE FRED 3000 3000
```

places one byte of main memory starting at &3000 into paged ram. It may be reloaded using *PLOAD FRED.

```
*PSAVE ABCDEFG 3000 7FFF
```

stores a 20k screen to paged ram.

```
*PSAVE ROB12
```

and saves the current Basic program.

All commands can be issued over the Tube, but the chip does not access Tube memory so Basic programs cannot be saved or loaded.

The chip only uses &B0 to &BF of main memory as scratch space, so it should not corrupt any applications, which cannot in turn accidentally corrupt the ram drive.

Paged ram is not affected by pressing Break, but anything in it will be lost when the machine is switched off unless you have an independent power supply.

over from the last write. The only other major test is timing. Having got this far chances are the board is perfectly constructed – but there is nothing like a little machine code to stretch the board to its limits in terms of speed – use menu option two to write two blocks of data to the first two pages, and then use option one to print them out again. The two pages should contain the values 255 down to 0.

These routines have been included mainly as an example of how to access blocks of paged ram from machine code. To access a single byte of memory at a time the following sort of code could be used, first to write 12 to location &5678:

```
LDA#&56:STA&FCFF \ high byte
LDX#&78:LDA#12:STA&FD00,X
```

and to read location &1234:

```
LDA#&12:STA&FCFF \ high byte
LDX#&34:LDA&FD00,X
```

What about the other menu options in program I? Option five performs a simple memory dump of any specified page in paged ram, and option seven is a PRBS test which will work with a 6502 2nd processor.

Note how this routine – procedure *tubeprbs* – uses osbyte calls to access I/O memory – Jim and Fred – and are essential if the ram board is to be used across the Tube. These calls, 146 to 149, are documented in the BBC Micro User Guide.

● *That concludes our paged ram project, but hopefully enough information has been provided to fuel further development into the many untapped applications of paged memory. As a starter, how about implementing a pull-down menu system for graphics modes? The speed of access to paged ram would result in some very flash CAD systems.*

➤

Commands

Command	Abbreviation	Description
PCAT	P.	Lists files currently held in the paged ram. The catalogue can hold as many files as memory will permit. Information for each file is given like this: <filename> <start addr> <end addr> <exec addr> (BASIC)
PFORMAT (<PR addr>)	PFO.	Prepares paged ram to receive files. <PR addr> specifies the highest address above which the format will not operate, enabling a section of paged ram to be reserved for user applications. The lowest value for <PR addr> is &0018, but it defaults to &7FFF if omitted.
PLOAD <filename> (<start addr>)	PL.	Loads a file from paged ram to its load address in main memory unless otherwise specified using <start addr>. When loading Basic programs to a different PAGE address from which they were saved, the new value of PAGE must be specified using <start addr>.
PSAVE <filename> (<start addr> <end addr> (<execution addr>) (<reload addr>))	PS.	Saves a file to paged ram from main memory. If no parameters are specified the file is treated as Basic and all relevant parameters – PAGE, TOP – are read from zero page. Unless otherwise specified the execution address defaults to zero and the reload address defaults to the start address.
PCOMPACT	*PCO.	When a lot of file saving and deleting is carried out the catalogue can become cluttered with gaps of free space once occupied by files. This command can therefore be used to place all these free gaps into one block, thus providing more space in paged ram for programs.
PFREE	PF.	Displays the amount of free memory available for file storage. This value may increase after issuing *PCOMPACT. When a file is saved, don't forget that 16 bytes are required for the catalogue entry as well as the program itself.
PDELETE <filename>	PD.	Marks <filename> as being deleted. This removes the file from the catalogue, although the contents will not be deleted until overwritten by another file.
PRENAME <source filename> <destination filename>	PR.	Renames the specified source filename. There is no effect if the destination filename already exists.

These commands can be used on non-formatted or reserved areas of formatted paged ram.

PBLOAD <PR start addr> <PR end addr> <start addr>	PB.	Copies a block of memory from paged ram into main memory starting at <start addr>. Among other things this command can be used to obtain paged ram catalogue information for use in a Basic program.
PBSAVE <start addr> <end addr> <PR start addr>	PBS.	Copies a block of main memory into paged ram. If the ram has been formatted be careful not to corrupt it.
PCLEAR <PR start addr> <PR end addr> <byte>	PCL.	Clears the specified area of paged ram with <byte>.

Addresses must be specified in hexadecimal. The paged ram maximum addressable range is &0000 to &FFFF – although the 32k version only formats up to a maximum of &7FFF. The address range for main memory is &0000 to &FFFF. The symbols < > imply parameters and ( ) imply optional parameters.

Filenames are strings of alphanumerics up to 7 characters long beginning and ending with at least one space or enclosed in quotation marks. Case distinction *is* made with filenames, but not with commands or hexadecimal characters used in the addresses. All commands may be preceded with "R" to avoid command clashes with other roms.

Table II: Error messages
All error messages are preceded with PR to enable identification of the source of the error.

PR bad format	The paged ram is not formatted or it has been corrupted.
PR no room	Paged ram is full. Using *PCOMPACT may provide more room.
PR file not found	The specified file cannot be found in the catalogue.
PR illegal filename	Filename contains too many or illegal characters.
PR missing filename parameter	A filename parameter was expected.
PR illegal address	Address is too large or contains illegal characters.
PR missing address parameter	An address parameter was expected.
PR file already exists	The specified filename already exists in the catalogue and cannot therefore be renamed or saved.

Table III: Technical Information.
Paged ram format conforms to the following protocol

0000-0004	Contains *RFORM* to identify a valid format.
0005-0006	Format high water mark (&7FFF by default).
0007	File 1 type:
00	No file exists, end of catalogue, in which case no catalogue information follows on from here.
01	File deleted – space may be overwritten.
02	Basic
03	Data or machine code.
0008-0009	File 1 PR start address
000A-000B	File 1 length (-1) – zero implies a length of one byte.
000C-0012	File 1 filename, seven characters, padded with zeros.
0013-0014	File 1 start address.
0015-0016	File 1 execution address.
0017-0018	File 2 type and so on.
	The files themselves are stored from the top of paged ram downwards, so that the last byte of the first program will be stored at &7FFF. For a 32k ram board, the maximum number of files is (&7FFF-7) DIV (16+1) = 1927, which means all files are one byte long, with each catalogue entry taking up 16 bytes.)

```
   10 REM 32K ram board pseudo random bi
nary sequence test.
   20 REM by Rob Anderson
   30 REM (c) The Micro User
   40 MODE128
   50 @%=&0000B
   60 PRINT"32K RAM EXPANSION BOARD"
   70 PRINT"Random number generator seed
ed with",RND(-1)
   80 PRINT"Writing 5 pages to the board
;"
   90 error%=FALSE
  100 FORH%=0TO4
  110 ?&FCFF=H%              :REM High byt
e
  120 PRINTH%
  130 FORL%=0TO255
  140 ?(&FD00+L%)=RND(256)-1
  150 NEXT,
  160 PRINT"FINISHED DUMP, re-reading va
lues;"
  170 PRINT"Seed set back to ",RND(-1)
  180 FORH%=0 TO 4
  190 ?&FCFF=H%
  200 PRINT"Page, Low address, Value wri
tten,       Value received"
  210 FORL%=0TO255
  220 R%=RND(256)-1
  230 PRINT;H%;"     ";L%,R%;" ("FNch(R%
);")",?(&FD00+L%);" (";FNch(?(&FD00+L%))
;")";
  240 IF?(&FD00+L%)<>R% PRINT"   ERROR":
error%=TRUE ELSE PRINT
  250 NEXT,
  260 IF error% PRINT"At least 1 error w
as encountered."
  270 END
  280:
  290 DEFFNch(num)
  300 answer$="":source$=""
  310 source$=STR$(num)
  320 oldbase%=10:newbase%=2
  330 FORcounter%=LENsource$ TO 1 STEP -
1
  340 decimalnum%=decimalnum%+((ASC(MID$
(source$,counter%,1))-48) - (7*((ASC(MID
$(source$,counter%,1)))DIV 65)))*(oldbas
e%)^(LENsource$-counter%)
  350 NEXT
  360 REPEAT answer$=STR$~(decimalnum% M
OD newbase%) + answer$
  370 decimalnum% = decimalnum% DIV newb
ase%
  380 UNTIL decimalnum% = 0
  390 =answer$
```

Get it right ✓

```
 10 =    0 0     210 = B485 A
 20 =    0 0     220 = A0FE 0
 30 =    0 0     230 = F0C6 6
 40 = BCCC C     240 = 69CF C
 50 = EFD0 6     250 = 8300 F
 60 = C672 0     260 = BC3B C
 70 = CEA5 2     270 = FD2E 3
 80 = 4385 6     280 = 9719 6
 90 = A716 2     290 = 5734 E
100 = BD69 F     300 = 5C15 9
110 = 2E10 B     310 = 1249 B
120 = 24C0 7     320 = 90BB A
130 = B485 B     330 = 59C2 9
140 = E4FA 7     340 = C0C8 0
150 = 8300 C     350 = 2C83 E
160 = 3039 B     360 = E272 E
170 = F2D3 2     370 = F45D 5
180 = E888 6     380 = CFCA 7
190 = AD72 0     390 = 5E32 5
200 = AD8A B
```

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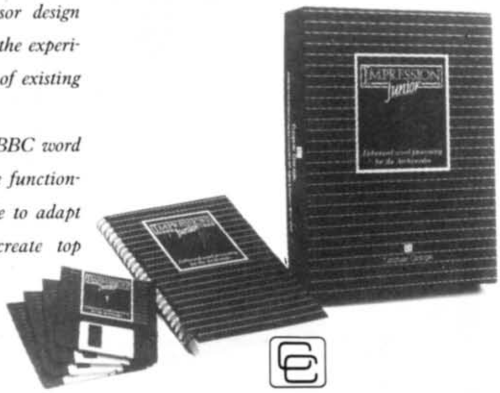

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THE BBC Micro has run the gamut of music programs from C major to B minor and back again, and still they come. The majority are of the *"You type music in and I'll play it back"* variety. It's fun – and educational to a point. But recent trends in music software are towards programs which help you compose.

As composition is now a part of the music syllabus, and as many pupils – not to mention teachers – find it a difficult subject, any program which can assist and stimulate the compositional process is to be welcomed.

Oddly, there is no specific mention of Opus's use in education either within the program or in the manual. The only clue you get to its educational leanings, apart from its heritage, is a label on the disc which says: "For use only in the establishment for which it was sold." The disc, incidentally, is not protected and the manual tells you to make a backup copy before use. Full marks there.

To quote from the manual: "Opus will allow you to create your own tunes, to explore harmony and to make your own compositions. You don't need any previous musical experience and do not need to know how to read conventional music notation." In Opus, you write tune modules on *cards* and then link them together to produce a complete composition.

There are three sections: The main screen, the composition screen and the editing screen. Options are selected by moving an arrow around the screen to point to an option and pressing Return. The program is written in Basic and the pointer moves in steps rather than a smooth slide, but that isn't a serious problem.

You can move the pointer with the cursor keys and speed up movement by holding down Control. You can also use a joystick or a tracker ball, although I found keyboard control better. If you have a Master you can use the Concept Keyboard too – more evidence of its educational aims.

The editing screen is where the interesting work is carried out so we'll look at that first. In the centre of the screen is a large grid. Down the left is a list of 22 note names, the musical range of the program, and across are 32 boxes in which notes are entered; this can be reduced down to 24.

To enter a note you position the arrow in a box and press Return. The arrow steps to the next box ready for another note. Pressing Return on a box already containing a note will remove it.

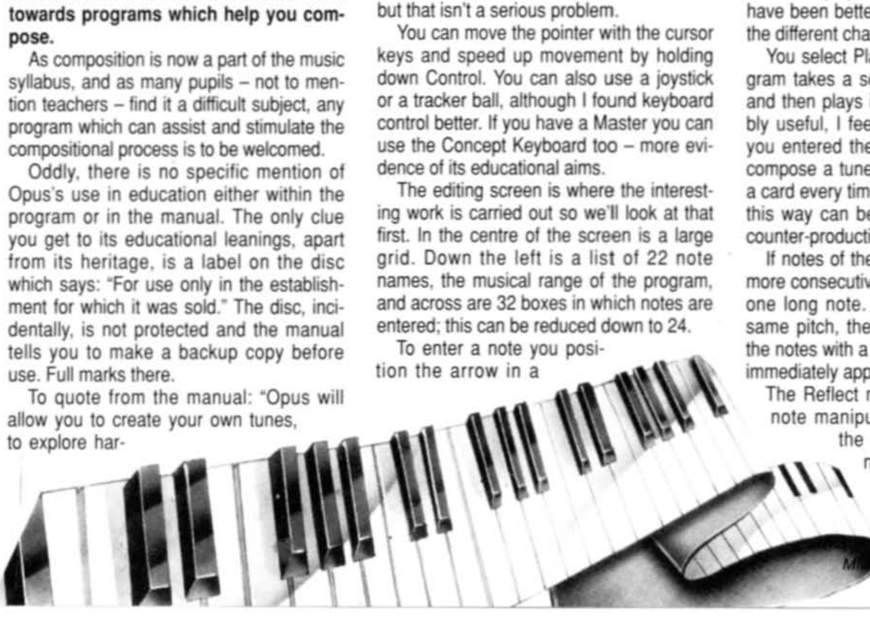
The program makes use of the BBC Micro's three sound channels and you can flip from channel to channel to enter three-part music on a single card. A channel one note appears as a line at the bottom of a box, a channel two note sits in the middle and a channel three note is at the top. Using this form of note representation it's not easy to imagine what they will sound like when played together. Perhaps it would have been better to use varying colours for the different channels.

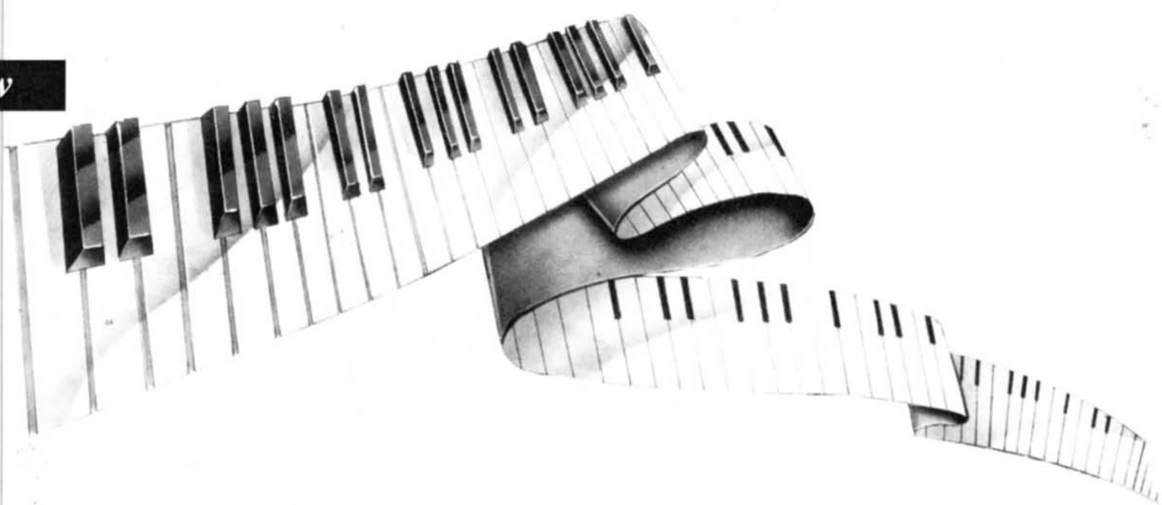
You select Play to hear a card. The program takes a second to compile the data, and then plays it. It would have been doubly useful, I feel, if the notes sounded as you entered them. It is difficult enough to compose a tune by ear, and having to test a card every time you enter a note or two in this way can be frustrating and, at times, counter-productive.

If notes of the same pitch occupy two or more consecutive grid boxes they sound as one long note. If you want to repeat the same pitch, therefore, you must separate the notes with a blank box. This may not be immediately apparent to a beginner.

The Reflect menu offers three types of note manipulation. Reverse switches the notes on a card so those near the beginning of the card now appear near the

➤





➤ end. Invert turns notes upside down and Shift is effectively a transposition function. You can elect to alter either just the current channel or the whole card.

These sorts of functions, used by composers for centuries, are easily implemented on a micro and offer a lot of potential for experimentation. A Copy function lets you copy one card to another – very useful – but a command to copy one channel's notes to another channel would have been handy too, especially when experimenting with the Reflect options.

More manipulations can be found under the Options menu. The first, Notes, lets you change the note list at the left of the grid. There are two fixed and one programmable list. The fixed lists are diatonic – a major scale – and chromatic semitones. The programmable scale defaults to pentatonic and a whole tone and quarter tone scale can be loaded from the disc.

A separate program on disc lets you define your own note lists. You can give each note a three-letter mnemonic. These need not have anything to do with music, call them sam, bob, joe – anything. You then enter a pitch number which the sound chip will use. Note lists can be saved and loaded independently of the notes on the cards, so you can create one note pattern and try it using several different scales.

Also in the Options menu are commands to alter pitch and volume and you can select one of six different envelope types either for the whole card or for each channel. You can't define your own envelopes – which I regard as something of a blessing in a program of this nature – but I could have wished for a few better sounds. Two, Pizz and Pop, are fairly similar and Vibra produces a horrible, heavy vibrato. The ENVELOPE command is capable of producing subtle vibrato, too.

A glossary incorrectly defines an envelope as that which gives each musical instrument its characteristic timbre – the waveform or harmonic content of a sound does that. The envelope determines how the amplitude of a sound various over time. I know it was trying to be both simple and helpful at the once, but if we are going to define words let's be accurate.

You can create tunes on up to 12 cards and then you go to the composer screen to link them together. This screen houses a 10 x 6 grid with the numbers 1 to 12 beneath representing the cards. To enter a card on to the grid point to it and press Return. You can delete entries and move forwards and backwards through the sequence.

Tempo can adjusted from the main screen. It's not in the traditional beats per minute but instead increments the duration of the columns in a card in twentieths of a second – the sound chip's basic duration setting. It defaults to four and can range from two to ten.

The disc contains three demo files – a Bach three-part Invention, In Dulcio Jubilo and an original composition which demonstrates the reflection commands. And quite impressive they are, too, although I didn't care for the envelopes used in the Bach Invention, but if you wish they can be changed.

A printout of any screen – always very useful in the classroom – is obtained by tapping Control+P. The manual is quite short at 20 pages but is to the point and contains lots of useful screen dumps.

The program is easy to understand and use, although it did prompt a couple of questions and a few niggles. It instantly brings to mind Andy Pierson's Compose. Both allow you to create tune modules on a grid and string them together to produce a complete song. Compose, however, is more flexible in several areas and contains several ready-made note sequences which allow even a complete musical novice to create pieces. It's more colourful and graphically appealing, too.

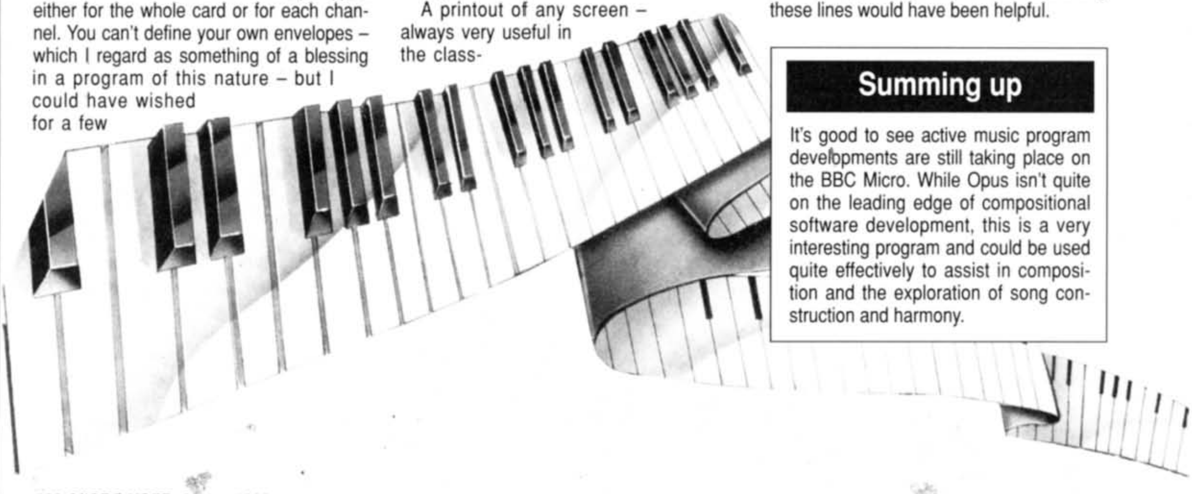
Opus has the advantage of allowing users to create three-part tunes and explore the harmonic relationship between notes. It is also, perhaps, initially easier to enter music on the grid, and the ability to define your own note lists opens the door for further exploration.

For a program which would obviously be at home in education it's a shame the manual contains no suggestions about its use in the classroom and within the music curriculum. I would also like to have seen more examples of user-defined note lists along with examples of more exotic harmonies.

For a practical and introductory exercise in composition, a teacher could construct a series of cards and pupils could be asked to put them together in the Composer screen and say why they chose that particular arrangement. Some demo files along these lines would have been helpful.

Summing up

It's good to see active music program developments are still taking place on the BBC Micro. While Opus isn't quite on the leading edge of compositional software development, this is a very interesting program and could be used quite effectively to assist in composition and the exploration of song construction and harmony.



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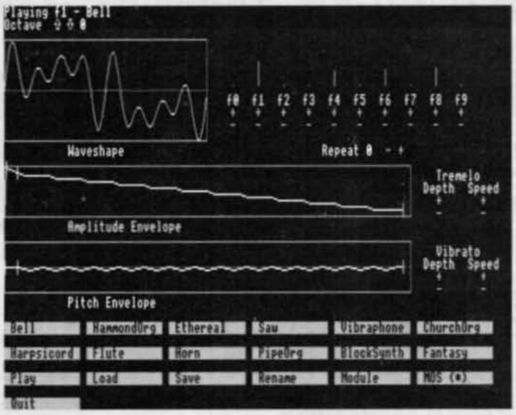
From Page 47

```
  330 :
  340 DEF PROCinit
  350 I%=PAGE+4
  360 REPEAT
  370 I%+=1
  380 UNTIL I%?-1=ASC">"
  390 PRINT $I%
  400 VoiceSize%=&500
  410 VoiceMax%=12
  420 DIM Module% &200,Code% V
oiceSize%*VoiceMax%,Work% &40
  430 DIM VoiceName%(VoiceMax%
),VoiceEnable%(VoiceMax%)
  440 DIM AmpEnv%(VoiceMax%),F
reEnv%(VoiceMax%),WaveTable%(V
oiceMax%)
  450 DIM OldVoice%(VoiceMax%)
,OldChannel%(8)
  460 DIM w%(VoiceMax%,255),pa
r%(VoiceMax%,25),Sine%(255,9)
  470 *POINTER
  480 MOUSE OFF
  490 PROChour(TRUE)
  500 FOR I%=0 TO 255
  510 PROChour(I% DIV 25+1)
  520 Sine%(I%,0)=(RND(1)-.5)*
16777216
  530 FOR J%=1 TO 9
  540 Sine%(I%,J%)=SIN(PI*I%*J
%/128)*16777216
  550 NEXT
  560 NEXT
  570 *KEY 0
!"
  580 *FX 4 1
  590 *FX 229 1
  600 *KEY 13
!!
  610 ENDPROC
  620 :
  630 DEF PROCassemble
  640 FOR v%=1 TO VoiceMax%
  650 PROChour(10+v%)
  660 VoiceEnable%(v%)=TRUE
  670 FOR I%=0 TO 2 STEP 2
  680 P%=Code%+VoiceSize%*v%-V
oiceSize%
  690 [OPT I%
  700 .VoiceBase
  710 B Fill
  720 B Fill
  730 B GateOn
  740 B GateOff
  750 B Instance
  760 LDMFD R13!,{PC}
  770 LDMFD R13!,{PC}
  780 EQUD VoiceName%(v%)-Voic
eBase
  790 ;
  800 .VoiceName%(v%)
  810 =FNbytes(19)
  820 ;
  830 .LogAmpPtr
  840 EQUD 0
  850 .WaveBase
  860 EQUD 0
  870 .AmpEnvPtr
  880 EQUD 0
  890 .FreEnvPtr
  900 EQUD 0
  910 .AmpEnv%(v%)
  920 =FNbytes(255)
  930 .FreEnv%(v%)
  940 =FNbytes(255)
  950 .WaveTable%(v%)
  960 =FNbytes(255)
  970 ;
```

20
19

12

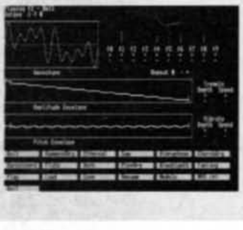
25,26 7



```
  980 .Instance
  990 STMFD R13!,{R0-R4}
 1000 ADR R1,VoiceBase
 1010 MOV R0,#AmpEnv%(v%)-Voic
eBase
 1020 ADD R0,R0,R1
 1030 STR R0,AmpEnvPtr
 1040 MOV R0,#FreEnv%(v%)-Voic
eBase
 1050 ADD R0,R0,R1
 1060 STR R0,FreEnvPtr
 1070 MOV R0,#WaveTable%(v%)-V
oiceBase
 1080 ADD R0,R0,R1
 1090 STR R0,WaveBase
 1100 MOV R0,#0
 1110 MOV R1,#0
 1120 MOV R2,#0
 1130 MOV R3,#0
 1140 MOV R4,#0
 1150 SWI "Sound_Configure"
 1160 LDR R0,[R3,#12]
 1170 STR R0,LogAmpPtr
 1180 LDMFD R13!,{R0-R4,PC}
 1190 ;
 1200 .GateOn
 1210 LDMIA R9,{R1-R8}
 1220 LDR R3,AmpEnvPtr
 1230 LDR R5,WaveBase
 1240 LDR R6,LogAmpPtr
 1250 LDR R7,FreEnvPtr
 1260 B FillGate
 1270 ;
 1280 .Fill
 1290 LDMIA R9,{R1-R8}
 1300 .FillGate
 1310 LDRB R0,[R7],#1
 1320 MOV R0,R0,ASL #24
 1330 ADD R2,R2,R0,ASR #24
 1340 AND R1,R1,#127
 1350 LDRB R0,[R3],#1
 1360 CMP R0,#255
 1370 MOVEQ R4,#0
 1380 CMPNE R4,#0
 1390 MOVEQ R0,#2
 1400 LDMEQFD R13!,{PC}
 1410 ;
 1420 SUBS R1,R1,R0
 1430 MOVMI R1,#0
 1440 LDRB R1,[R6,R1,LSL #1]
 1450 MOV R1,R1,LSR #1
 1460 RSB R1,R1,#127
 1470 .FillLoop
 1480 ADD R2,R2,R2,LSL #16
 1490 LDRB R0,[R5,R2,LSR #24]
 1500 SUBS R0,R0,R1,LSL #1
 1510 MOVMI R0,#0
 1520 STRB R0,[R12],R11
 1530 ADD R2,R2,R2,LSL #16
 1540 LDRB R0,[R5,R2,LSR #24]
 1550 SUBS R0,R0,R1,LSL #1
 1560 MOVMI R0,#0
 1570 STRB R0,[R12],R11
 1580 ADD R2,R2,R2,LSL #16
 1590 LDRB R0,[R5,R2,LSR #24]
 1600 SUBS R0,R0,R1,LSL #1
 1610 MOVMI R0,#0
 1620 STRB R0,[R12],R11
 1630 ADD R2,R2,R2,LSL #16
 1640 LDRB R0,[R5,R2,LSR #24]
 1650 SUBS R0,R0,R1,LSL #1
 1660 MOVMI R0,#0
 1670 STRB R0,[R12],R11
 1680 CMP R12,R10
 1690 BLT FillLoop
 1700 .FillExit
 1710 SUB R4,R4,#1
 1720 STMIB R9,{R2-R8}
 1730 MOV R0,#8
 1740 LDMFD R13!,{PC}
 1750 ;
 1760 .GateOff
 1770 MOV R0,#0
 1780 .FlushLoop
 1790 STRB R0,[R12],R11
 1800 STRB R0,[R12],R11
 1810 STRB R0,[R12],R11
 1820 STRB R0,[R12],R11
 1830 CMP R12,R10
 1840 BLT FlushLoop
 1850 MOV R0,#1
 1860 LDMFD R13!,{PC}
 1870 ]
 1880 NEXT
 1890 NEXT
 1900 :
 1910 FOR I%=0 TO 2 STEP 2
 1920 P%=Work%
 1930 [ OPT I%
 1940 .Log
 1950 SWI "Sound_SoundLog"
 1960 SWI "Sound_LogScale"
 1970 STRB R0,[R2,R1]
 1980 MOV PC,R14
 1990 .Type
 2000 =FNbytes(7)
 2010 ]
 2020 NEXT
 2030 ENDPROC
 2040 :
 2050 DEF FNbytes(n%)
 2060 P%+=n%
 2070 =I%
 2080 :
 2090 DEF PROCchannels
 2100 RESTORE +0
 2110 FOR v%=1 TO VoiceMax%
 2120 PROChour(22+v%*6)
 2130 OSCLI"KEY "+STR$ v%+CHR$
(v%+199)+"
M"
 2140 READ a$,b$
 2150 $VoiceName%(v%)="UserLib
-"+LEFT$(a$+STRING$(11,CHR$0),
11)
 2160 FOR I%=0 TO 25
 2170 par%(v%,I%)=EVAL("&"+LEF
T$(b$,2))
 2180 b$=MID$(b$,3)
 2190 NEXT
 2200 PROCfillwave(v%)
 2210 PROChour(25+v%*6)
 2220 PROCenvelope(v%)
 2230 SYS "Sound_InstallVoice"
,Code%+v%*VoiceSize%-VoiceSize
%,0 TO a%,OldVoice%(v%)
 2240 NEXT
 2250 Voice%=1
 2260 FOR v%=1 TO 8
 2270 SYS "Sound_AttachVoice",
v%,0 TO z%,OldChannel%(v%)
 2280 VOICE v%,$VoiceName%(Voi
ce%)
 2290 NEXT
 2300 VOICES 8
 2310 ENDPROC
 2320 DATA Bell,003A0000230028
002D00007F01700804FB0005000008
00080835
 2330 DATA HammondOrg,002F120D
1D001E0023000F77047F1015FE0705
00000C00110F05
 2340 DATA Ethereal,0161121106
080806090A0F6F077F1926FF000203
000200320835
 2350 DATA Saw,00512E1C0000000
1000012690B7F2808FF00050000020
0140865
 2360 DATA Vibraphone,00470100
0F0001002700DC7E016F041AF01706
02020202000435
```

All program listings in this issue can be downloaded FREE on...
MicroLink

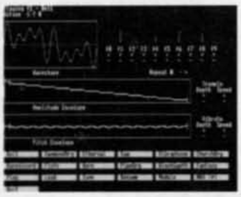
```
 2370 DATA ChurchOrg,0771071B0
00000006000F6F077F1932F800020
302020000805
 2380 DATA Harpsicord,0139100E
150E12100F11007C0170080AC20002
03000200000805
 2390 DATA Flute,1356152903000
1000000106E077F160A9E050400020
200000835
 2400 DATA Horn,062E2719151308
080200007C036E1E103B0002020002
00000705
 2410 DATA PipeOrg,083C0014012
C011A0100126003683F37FA0503000
20200000705
 2420 DATA BlockSynth,00170017
001600280129087A0170092AFF2303
00023602110B05
 2430 DATA Fantasy,00330014180
0080016230A7C0454332CF52205004
01340110530
 2440 :
 2450 DEF PROCmenu
 2460 Sel%=14
 2470 REPEAT
 2480 IF Sel%>12 THEN
 2490 OFF
 2500 PROCmenu_bars
 2510 MOUSE TO 560,48
 2520 ENDIF
 2530 MOUSE ON
 2540 *FX 21 9
 2550 REPEAT
 2560 MOUSE x%,y%,b%
 2570 IF y%>288 PROCedit
 2580 x%=x% DIV 208
 2590 IF x%>5 x%=5
 2600 y%=3-(y%+16) DIV 64
 2610 Sel%=x%+y%*6+1
 2620 UNTIL b%=1 OR b%=4
 2630 REPEAT
 2640 MOUSE x%,x%,z%
 2650 UNTIL z%=0
 2660 *FX 21
 2670 MOUSE OFF
 2680 VDU 28,0,31,79,24
 2690 IF Sel%>12 CLS
 2700 CASE Sel% OF
 2710 WHEN 1,2,3,4,5,6,7,8,9,1
0,11,12:IF b%=1 THEN
 2720 IF Sel%<>Voice% VoiceEna
ble%(Sel%)=VoiceEnable%(Sel%)
EOR TRUE
 2730 PROCmenu_bars
 2740 ELSE
 2750 PROCvoice(Sel%)
 2760 ENDIF
 2770 WHEN 13:PROCplay
 2780 WHEN 14:PROCload
 2790 WHEN 15:PROCsave
 2800 WHEN 16:PROCrename
 2810 WHEN 17:PROCmodulc
 2820 WHEN 18:PROCstar
 2830 ENDCASE
 2840 UNTIL Sel%=19
 2850 ENDPROC
 2860 :
 2870 DEF PROCtidy
 2880 FOR v%=1 TO VoiceMax%
 2890 SYS "Sound_RemoveVoice",
0,OldVoice%(v%)
 2900 NEXT
 2910 FOR v%=1 TO 8
 2920 SYS "Sound_AttachVoice",
v%,OldChannel%(v%)
 2930 NEXT
 2940 VOICES 1
 2950 *FX 4
 2960 *FX 12
 2970 *FX 229
 2980 MOUSE OFF
 2990 ON
 3000 PRINT
 3010 ENDPROC
 3020 :
 3030 DEF PROCmenu_bars
 3040 VDU 28,0,31,79,24,12
 3050 RESTORE+0
 3060 FOR I%=0 TO VoiceMax%-1
 3070 IF VoiceEnable%(I%+1) TH
EN
 3080 COLOUR 0
 3090 COLOUR 134
 3100 ELSE
 3110 COLOUR 7
```



```
 3120 COLOUR 132
 3130 ENDIF
 3140 PRINT TAB(I% MOD 6*13,I%
 DIV 6*2+1) SPC 12 STRING$(11,
CHR$ 8) MID$($VoiceName%(I%+1)
,9)
 3150 NEXT
 3160 COLOUR 0
 3170 COLOUR 134
 3180 FOR I%=0 TO 6
 3190 READ a$
 3200 PRINT TAB(I% MOD 6*13,I%
 DIV 6*2+5) SPC 12 STRING$(11,
CHR$ 8) a$;
 3210 NEXT
 3220 COLOUR 7
 3230 COLOUR 128
 3240 ENDPROC
 3250 DATA Play,Load,Save,Rena
me,Module,MOS (*),Quit
 3260 :
 3270 DEF PROCplay
 3280 V%=1
 3290 OSCLI"FX 11 "+STR$ par%(
Voice%,10)
 3300 IF par%(Voice%,10) OSCLI
"FX 12 "+STR$ par%(Voice%,10)
 3310 VDU 26
 3320 RESTORE+0
 3330 PROCdata_print(7)
 3340 PROCprompt
 3350 REPEAT
 3360 *FX 21
 3370 G%=GET
 3380 IF INKEY-98:PROCkey(0)
 3390 IF INKEY-82:PROCkey(4)
 3400 IF INKEY-67:PROCkey(8)
 3410 IF INKEY-51:PROCkey(12)
 3420 IF INKEY-83:PROCkey(16)
 3430 IF INKEY-100:PROCkey(20)
 3440 IF INKEY-84:PROCkey(24)
 3450 IF INKEY-101:PROCkey(28)
 3460 IF INKEY-85:PROCkey(32)
 3470 IF INKEY-86:PROCkey(36)
 3480 IF INKEY-70:PROCkey(40)
 3490 IF INKEY-102:PROCkey(44)
 3500 IF INKEY-103:PROCkey(48)
 3510 IF INKEY-87:PROCkey(52)
 3520 IF INKEY-104:PROCkey(56)
 3530 IF INKEY-88:PROCkey(60)
 3540 IF INKEY-105:PROCkey(64)
 3550 IF INKEY-97:PROCkey(20)
 3560 IF INKEY-49:PROCkey(24)
 3570 IF INKEY-17:PROCkey(28)
 3580 IF INKEY-50:PROCkey(32)
 3590 IF INKEY-34:PROCkey(36)
 3600 IF INKEY-18:PROCkey(40)
 3610 IF INKEY-35:PROCkey(44)
 3620 IF INKEY-52:PROCkey(48)
 3630 IF INKEY-20:PROCkey(52)
 3640 IF INKEY-36:PROCkey(56)
 3650 IF INKEY-53:PROCkey(60)
 3660 IF INKEY-69:PROCkey(64)
 3670 IF INKEY-54:PROCkey(68)
 3680 IF INKEY-22:PROCkey(72)
 3690 IF INKEY-38:PROCkey(76)
 3700 IF INKEY-39:PROCkey(80)
 3710 IF INKEY-55:PROCkey(84)
 3720 IF INKEY-40:PROCkey(88)
 3730 IF INKEY-56:PROCkey(92)
 3740 IF INKEY-57:PROCkey(96)
 3750 IF INKEY-94:PROCkey(100)
 3760 IF INKEY-89:PROCkey(104)
 3770 IF INKEY-47:PROCkey(108)
 3780 IF INKEY-121:PROCkey(112
)
 3790 IF INKEY-42:PROCpitch(-1
)
 3800 IF INKEY-58:PROCpitch(1)
 3810 IF G%>199 AND G%<213 PRO
Cvoice(G%-199):PROCprompt
 3820 UNTIL G%=27
 3830 PRINT TAB(44,0) SPC20 TA
B(45,1) SPC18
 3840 ENDPROC
 3850 DATA 3,1
 3860 DATA 64,26,Upper Keyboar
d,64,29,Lower Keyboard
 3870 DATA 1,1
 3880 DATA 4,25,1   2   3
  5   6       8   9   0
=   FALSE
 3890 DATA 12,29,S   D       G
   H   J       L   ;
 3900 DATA 7,1
 3910 DATA 1,26,tab   Q   W
E   R   T   Y   U   I   O   P
  [   ]   \
 3920 DATA 10,30,"Z   X   C
V   B   N   M   ,   .   /"
 3930 :
 3940 DEF PROCedit
 3950 LOCAL Env%,Wave%,Flag%
 3960 VDU 26
 3970 REPEAT
 3980 MOUSE X%,Y%,B%
 3990 G%=INKEY(0)
 4000 IF B%=4 THEN
 4010 IF Flag%=0 PROCflag
 4020 CASE Flag% OF
 4030 WHEN 10:Wave%=FNsetwave
 4040 WHEN 9:PROCsetrep
 4050 WHEN 1,2,3:PROCsetamp
 4060 WHEN 7:Env%=FNsettrem
 4070 WHEN 4,5,6:PROCsetfre
 4080 WHEN 8:Env%=FNsetvib
 4090 ENDCASE
 4100 ELSE
 4110 Flag%=0
 4120 ENDIF
 4130 UNTIL Y%<256
 4140 IF Wave% PROCfillwave(Vo
ice%)
 4150 IF Env% PROCenvelope(Voi
ce%)
 4160 IF Env% OR Wave% PROCdis
play
 4170 ENDPROC
 4180 :
 4190 DEF PROCload
 4200 LOCAL File%,File$
 4210 File$=MID$($VoiceName%(V
oice%),9)
 4220 PROCname("voice to load"
,File$)
 4230 File%=OPENIN File$
 4240 IF File%=0 THEN
 4250 PRINT "No such file - Pr
ess a key"
 4260 IF GET
 4270 ELSE
 4280 FOR I%=0 TO 5
 4290 Type?I%=BGET#File%
 4300 NEXT
 4310 Type?5=13
 4320 IF $Type<>"Synth" THEN
 4330 PRINT "Invalid file type
 - Press a key"
 4340 IF GET
 4350 ELSE
 4360 FOR I%=0 TO 25
 4370 INPUT#File%,par%(Voice%,
I%)
 4380 NEXT
 4390 PROCfillwave(Voice%)
 4400 PROCenvelope(Voice%)
 4410 $VoiceName%(Voice%)="Use
rLib-"+LEFT$(File$+STRING$(11,
CHR$0),11)
 4420 PROCdisplay
 4430 ENDIF
 4440 CLOSE#File%
 4450 ENDIF
 4460 ENDPROC
 4470 :
 4480 DEF PROCsave
 4490 LOCAL File%,File$
 4500 File$=MID$($VoiceName%(V
oice%),9)
 4510 PROCname("voice to save"
,File$)
 4520 File%=OPENOUT File$
 4530 IF File% THEN
 4540 BPUT#File%,"Synth"
 4550 FOR I%=0 TO 25
 4560 PRINT#File%,par%(Voice%,
I%)
 4570 NEXT
 4580 CLOSE#File%
 4590 $VoiceName%(Voice%)="Use
rLib-"+LEFT$(File$+STRING$(11,
CHR$0),11)
 4600 PROCdisplay
 4610 ENDIF
 4620 ENDPROC
 4630 :
 4640 DEF PROCrename
 4650 LOCAL Name$
 4660 Name$=MID$($VoiceName%(V
oice%),9)
 4670 PROCname("new voice",Nam
e$)
 4680 $VoiceName%(Voice%)="Use
rLib-"+LEFT$(Name$+STRING$(11,
CHR$0),11)
 4690 PROCdisplay
 4700 ENDPROC
 4710 :
 4720 DEF PROCmodule
 4730 LOCAL VoiceTotal%,File%,
File$
 4740 FOR v%=1 TO VoiceMax%
 4750 IF VoiceEnable%(v%) Voic
eTotal%+=1
 4760 NEXT
 4770 FOR I%=0 TO 2 STEP 2
 4780 P%=Module%
 4790 [ OPT I%
 4800 EQUD 0
 4810 EQUD Initialise-Module%
 4820 EQUD Finalise-Module%
 4830 EQUD 0
 4840 EQUD Title-Module%
 4850 EQUD Help-Module%
 4860 EQUD 0
 4870 ;
 4880 .Title
 4890 EQUS "UserVoiceLib"
 4900 EQUB 0
 4910 ALIGN
 4920 ;
 4930 .Help
 4940 EQUS "User Defined Sound
Voices"+MID$(TIME$,7,9)
 4950 EQUB 0
 4960 ALIGN
 4970 ;
 4980 .VoiceNumbers
```

➤

```
4990 =FNbytes(VoiceTotal%-1)
5000 ALIGN
5010 ;
5020 .Initialise
5030 STMFD R13!,{R14}
5040 ADR R2,VoiceCode
5050 ADR R3,VoiceNumbers
5060 ]
5070 FOR v%=1 TO VoiceMax%
5080 IF VoiceEnable%(v%) THEN
5090 [OPT I%
5100 MOV R0,R2
5110 MOV R1,#0
5120 SWI "Sound_InstallVoice"
5130 STRB R1,[R3],#1
5140 ADD R2,R2,#VoiceSize%
5150 ]
5160 ENDIF
5170 NEXT
5180 [OPT I%
5190 LDMFD R13!,{R15}
5200 ;
5210 .Finalise
5220 STMFD R13!,{R14}
5230 ADR R2,VoiceNumbers
5240 ADD R3,R2,#VoiceTotal%
5250 .FinLoop
5260 LDRB R1,[R2],#1
5270 SWI "Sound_RemoveVoice"
5280 CMP R3,R2
5290 BNE FinLoop
5300 LDMFD R13!,{R15}
5310 .VoiceCode
5320 ]
5330 NEXT
5340 File$="SMOD"
5350 PROCname("module to save
",File$)
5360 File%=OPENOUT File$
5370 FOR I%=Module% TO VoiceC
ode-1
5380 BPUT# File%,?I%
5390 NEXT
5400 FOR v%=1 TO VoiceMax%
5410 IF VoiceEnable%(v%) THEN
5420 FOR I%=0 TO VoiceSize%-1
5430 BPUT# File%,Code%?(I%+v%
*VoiceSize%-VoiceSize%)
5440 NEXT
5450 ENDIF
5460 NEXT
5470 CLOSE# File%
5480 OSCLI "SETTYPE "+File$+"
Module"
5490 ENDPROC
5500 :
5510 DEF PROCstar
5520 LOCAL Input$
5530 ON
5540 REPEAT
5550 INPUT'"*" Input$
5560 OSCLI Input$
5570 PRINT "Press a key";
5580 Input$=GET$
5590 UNTIL Input$<>"*"
5600 ENDPROC
5610 :
5620 DEF PROCdisplay
5630 VDU 28,0,23,79,0,12,5
5640 GCOL0,2
5650 RECTANGLE 0,680,512,256
5660 RECTANGLE 0,488,1024,128
5670 RECTANGLE 0,298,1024,128
5680 MOVE 0,808:PLOT 49,512,0
5690 MOVE 0,362:PLOT 49,1024,
0
5700 FOR I%=0 TO 9
5710 GCOL0,3:MOVE I%*64+560,7
96:PRINT"f";I%
5720 GCOL0,6:MOVE I%*64+568,7
64:PRINT"+";
5730 PRINT CHR$8 CHR$10"-"
5740 NEXT
5750 PROCharmonic(7)
5760 MOVE 0,808
5770 FOR I%=0 TO 255
5780 DRAW I%*2,w%(Voice%,I%)+
808
5790 NEXT
5800 PROCamplitude(7)
5810 PROCfrequency(7)
5820 VDU 4:OFF
5830 RESTORE+0
5840 PROCdata_print(6)
5850 COLOUR 7
5860 PROCpitch(0)
5870 PRINT TAB(8,0)"f";Voice%
" - " MID$($VoiceName%(Voice%
),9) TAB(8,1)CHR$139" " CHR$13
8 TAB(57,11);par%(Voice%,10)
5880 OSCLI"FX 11 "+STR$ par%(
Voice%,10)
5890 IF par%(Voice%,10) OSCLI
"FX 12 "+STR$ par%(Voice%,10)
5900 ENDPROC
5910 DATA 3,9
5920 DATA 0,0,Playing
5930 DATA 0,1,Octave,10,11,Wa
veshape,50,11,Repeat,68,13,Tre
melo
5940 DATA 66,14,Depth  Speed,
10,17,Amplitude Envelope,68,19
,Vibrato
5950 DATA 66,20,Depth  Speed,
10,23,Pitch Envelope
5960 DATA 6,5
5970 DATA 62,11,+,68,15,+
 +,68,21,+      +
5980 DATA 60,11,-,68,16,-
 -,68,22,-      -
5990 :
6000 DEF PROCkey(T%)
6010 SOUND V%,-15,T%+par%(Voi
ce%,25),40:V%=V%MOD8+1
6020 ENDPROC
6030 :
6040 DEF PROCvoice(n%)
6050 IF VoiceEnable%(n%) THEN
6060 IF Voice%<>n%
6070 Voice%=n%
6080 FOR v%=1 TO 8
6090 VOICE v%,$VoiceName%(Voi
ce%)
6100 NEXT
6110 PROCdisplay
6120 ENDIF
6130 ENDIF
6140 ENDPROC
6150 :
6160 DEF PROCpitch(n%)
6170 IF n%>0 THEN
6180 IF par%(Voice%,25)<101 p
ar%(Voice%,25)+=48
6190 ELSE
6200 IF n%<0 THEN
6210 IF par%(Voice%,25)>5 par
%(Voice%,25)-=48
6220 ENDIF
6230 ENDIF
6240 PRINT TAB(12,1);par%(Voi
ce%,25) DIV6-8" "
6250 REPEAT
6260 UNTIL NOT INKEY-42 AND N
OT INKEY-58
6270 ENDPROC
6280 :
6290 DEF PROCflag
6300 LOCAL a%
6310 a%=X% DIV4
6320 IF Y%>636 THEN
6330 IF X%>512 AND Y%>696 AND
 Y%<768 Flag%=10 ELSE IF X%>92
8 AND Y%<672 Flag%=9
6340 ELSE
6350 IF X%<1024 THEN
6360 IF Y%>488 AND Y%<620 THE
N
6370 IF a%-par%(Voice%,12)<pa
r%(Voice%,14)-a% Flag%=1 ELSE
IF a%-par%(Voice%,14)>par%(Voi
ce%,16)-a% Flag%=3 ELSE Flag%=
2
6380 ELSE
6390 IF Y%>296 AND Y%<424 THE
N
6400 IF a%<par%(Voice%,21)-a%
 Flag%=4 ELSE IF a%-par%(Voice
%,21)>par%(Voice%,16)-a% Flag%
=6 ELSE Flag%=5
6410 ENDIF
6420 ENDIF
6430 ELSE
6440 IF X%>1036 THEN
6450 IF Y%>482 AND Y%<544 Fla
g%=7 ELSE IF Y%>290 AND Y%<352
 Flag%=8
6460 ENDIF
6470 ENDIF
6480 ENDIF
6490 ENDPROC
6500 :
6510 DEF FNsetwave
6520 PROCharmonic(0)
6530 N%=(X%-544)DIV64
6540 IF N%>9 N%=9
6550 IF Y%<732 AND par%(Voice
%,N%)>0 par%(Voice%,N%)=par%(V
oice%,N%)-1 ELSE IF par%(Voice
%,N%)<127 par%(Voice%,N%)=par%
(Voice%,N%)+1
6560 *FX 21
6570 PROCharmonic(7)
6580 =TRUE
6590 :
6600 DEF PROCsetrep
6610 COLOUR 7
6620 IF X%<992 THEN
6630 IF par%(Voice%,10)>6 par
%(Voice%,10)-=1 ELSE par%(Voic
e%,10)=0
6640 ELSE
6650 IF par%(Voice%,10)<98 AN
D par%(Voice%,10) par%(Voice%,
10)+=1 ELSE par%(Voice%,10)=6
6660 ENDIF
6670 PRINT TAB(57,11);par%(Vo
ice%,10)" "
6680 PROCwait
6690 ENDPROC
6700 :
6710 DEF PROCsetamp
6720 PROCamplitude(0)
6730 PROCfrequency(0)
6740 IF Flag%=1 PROCsetbars(4
88,par%(Voice%,12),par%(Voice%
,11)) ELSE IF Flag%=2 PROCsetb
ars(488,par%(Voice%,14),par%(V
oice%,13)) ELSE PROCsetbars(48
8,par%(Voice%,16),par%(Voice%,
15))
6750 IF par%(Voice%,16)<12 pa
r%(Voice%,16)=12
6760 IF par%(Voice%,21)>par%(
Voice%,16) par%(Voice%,21)=par
%(Voice%,16)-1
6770 IF par%(Voice%,12)=0 par
%(Voice%,12)=1
6780 IF par%(Voice%,14)<=par%
(Voice%,12) par%(Voice%,14)=pa
r%(Voice%,12)+1 ELSE IF par%(V
oice%,14)>=par%(Voice%,16) par
%(Voice%,14)=par%(Voice%,16)-1
6790 PROCfrequency(7)
6800 PROCamplitude(7)
6810 ENDPROC
6820 :
6830 DEF FNsettrem
6840 PROCamplitude(0)
6850 IF X%<1152 THEN
6860 IF Y%<508 THEN
6870 IF par%(Voice%,17)>0 par
%(Voice%,17)-=1
6880 ELSE
6890 IF par%(Voice%,17)<100 p
ar%(Voice%,17)+=1
6900 ENDIF
6910 ELSE
6920 IF Y%<508 THEN
6930 IF par%(Voice%,18)<40 pa
r%(Voice%,18)+=1
6940 ELSE
6950 IF par%(Voice%,18)>2 par
%(Voice%,18)-=1
6960 ENDIF
6970 ENDIF
6980 PROCamplitude(7)
6990 PROCwait
7000 =TRUE
7010 :
7020 DEF PROCsetfre
7030 LOCAL Null%
7040 IF X%<12 Null%=par%(Voic
e%,16)
7050 PROCfrequency(0)
7060 IF Flag%=4 PROCsetbars(3
60,Null%,par%(Voice%,19)) ELSE
 IF Flag%=5 PROCsetbars(360,pa
r%(Voice%,21),par%(Voice%,20))
 ELSE PROCsetbars(360,Null%,pa
r%(Voice%,22))
7070 IF par%(Voice%,21)<2 par
%(Voice%,21)=2 ELSE IF par%(Vo
ice%,21)>=par%(Voice%,16) par%
(Voice%,21)=par%(Voice%,16)-1
7080 PROCfrequency(7)
7090 ENDPROC
7100 :
```



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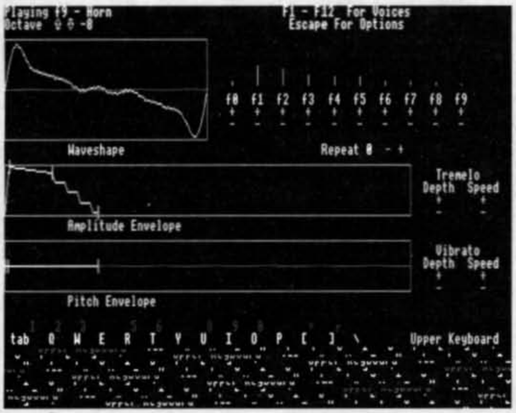
```
 7110 DEF FNsetvib
 7120 PROCfrequency(0)
 7130 IF X%<1152 THEN
 7140 IF Y%<316 THEN
 7150 IF par%(Voice%,23)>0 par
%(Voice%,23)-=1
 7160 ELSE
 7170 IF par%(Voice%,23)<100 p
ar%(Voice%,23)+=1
 7180 ENDIF
 7190 ELSE
 7200 IF Y%<316 THEN
 7210 IF par%(Voice%,24)<36 pa
r%(Voice%,24)+=1
 7220 ELSE
 7230 IF par%(Voice%,24)>2 par
%(Voice%,24)-=1
 7240 ENDIF
 7250 ENDIF
 7260 PROCfrequency(7)
 7270 PROCwait
 7280 =TRUE
 7290 :
 7300 DEF PROCsetbars(a%,RETUR
N H%,RETURN V%)
 7310 Env%=TRUE
 7320 H%=X% DIV 4
 7330 V%=Y%-a%
 7340 IF a%=488 THEN
 7350 IF V%>127 V%=127 ELSE IF
 V%<0 V%=0
 7360 ELSE
 7370 IF V%>64 V%=64 ELSE IF V
%<-64 V%=-64
 7380 ENDIF
 7390 IF H%>255 H%=255
 7400 ENDPROC
 7410 :
 7420 DEF PROCfillwave(Voice%)
 7430 FOR B%=0 TO 255
 7440 A%=0
 7450 FOR J%=0 TO 9
 7460 IF par%(Voice%,J%) A%+=p
ar%(Voice%,J%)*Sine%(B%,J%)
 7470 NEXT
 7480 w%(Voice%,B%)=A%>>24
 7490 C%=WaveTable%(Voice%)
 7500 CALL Log
 7510 NEXT
 7520 ENDPROC
 7530 :
 7540 DEF PROCenvelope(Voice%)
 7550 M%=AmpEnv%(Voice%)
 7560 level=0
 7570 PROCamp_env(par%(Voice%,
11)/par%(Voice%,12),par%(Voice
%,12))
 7580 PROCamp_env((par%(Voice%
,13)-par%(Voice%,11))/(par%(Vo
ice%,14)-par%(Voice%,12)),par%
(Voice%,14)-par%(Voice%,12))
 7590 S%=par%(Voice%,14)+par%(
Voice%,18)
 7600 sus=(par%(Voice%,13)-par
%(Voice%,15))/(par%(Voice%,16)
-par%(Voice%,14))*4
 7610 WHILE S%<par%(Voice%,16)
 7620 PROCamp_env(-sus-par%(Vo
ice%,17)/par%(Voice%,18),par%(
Voice%,18))
 7630 S%+=par%(Voice%,18)
 7640 IF S%<par%(Voice%,16) PR
OCamp_env(0,par%(Voice%,18)):S
%+=par%(Voice%,18)
 7650 IF S%<par%(Voice%,16) PR
OCamp_env(par%(Voice%,17)/par%
(Voice%,18),par%(Voice%,18)):S
%+=par%(Voice%,18)
```

```
 7660 IF S%<par%(Voice%,16) PR
OCamp_env(0,par%(Voice%,18)):S
%+=par%(Voice%,18)
 7670 ENDWHILE
 7680 IF M%-AmpEnv%(Voice%)<25
6 ?M%=255 ELSE AmpEnv%(Voice%)
?255=255
 7690 M%=FreEnv%(Voice%)
 7700 PROCfre_env(par%(Voice%,
19),1)
 7710 PROCfre_env((par%(Voice%
,20)-par%(Voice%,19))/(par%(Vo
ice%,21)-1),par%(Voice%,21))
 7720 S%=par%(Voice%,21)+par%(
Voice%,24)
 7730 sus=(par%(Voice%,20)-par
%(Voice%,22))/(par%(Voice%,16)
-par%(Voice%,21))*2
 7740 WHILE S%<par%(Voice%,16)
 7750 PROCfre_env(-sus-par%(Vo
ice%,23)/par%(Voice%,24),par%(
Voice%,24))
 7760 S%+=par%(Voice%,24)
 7770 IF S%<par%(Voice%,16) PR
OCfre_env(par%(Voice%,23)/par%
(Voice%,24),par%(Voice%,24)):S
%+=par%(Voice%,24)
 7780 ENDWHILE
 7790 IF M%-FreEnv%(Voice%)>25
5 THEN
 7800 M%?255=0
 7810 ELSE
 7820 WHILE M%-FreEnv%(Voice%)
<256
 7830 ?M%=0
 7840 M%+=1
 7850 ENDWHILE
 7860 ENDIF
 7870 ENDPROC
 7880 :
 7890 DEF PROCamp_env(s,n%)
 7900 FOR I%=1 TO n%
 7910 level+=s
 7920 IF level>127 ?M%=0 ELSE
IF level<0 ?M%=127 ELSE ?M%=12
7-level
 7930 M%+=1
 7940 NEXT
 7950 ENDPROC
 7960 :
 7970 DEF PROCfre_env(s%,n%)
 7980 FOR I%=1 TO n%
 7990 ?M%=s%
 8000 M%+=1
 8010 NEXT
 8020 ENDPROC
 8030 :
```

```
 8040 DEF PROCharmonic(Col%)
 8050 GCOL 0,Col%
 8060 FOR I%=0 TO 9
 8070 MOVE I%*64+576,822:PLOT
1,0,par%(Voice%,I%)
 8080 NEXT
 8090 ENDPROC
 8100 :
 8110 DEF PROCamplitude(Col%)
 8120 GCOL0,Col%:MOVE 0,488:PL
OT 1,par%(Voice%,12)*4,par%(Vo
ice%,11)
 8130 PROCpeg
 8140 PLOT 1,(par%(Voice%,14)-
par%(Voice%,12))*4,(par%(Voice
%,13)-par%(Voice%,11))
 8150 PROCpeg
 8160 S%=par%(Voice%,14)+par%(
Voice%,18)
 8170 sus=(par%(Voice%,13)-par
%(Voice%,15))/(par%(Voice%,16)
-par%(Voice%,14))*4
 8180 WHILE S%<par%(Voice%,16)
 8190 PLOT 1,par%(Voice%,18)*4
,-sus*par%(Voice%,18)-par%(Voi
ce%,17)
 8200 S%+=par%(Voice%,18)
 8210 IF S%<par%(Voice%,16) PL
OT 1,par%(Voice%,18)*4,0:S%+=p
ar%(Voice%,18)
 8220 IF S%<par%(Voice%,16) PL
OT 1,par%(Voice%,18)*4,par%(Vo
ice%,17):S%+=par%(Voice%,18)
 8230 IF S%<par%(Voice%,16) PL
OT 1,par%(Voice%,18)*4,0:S%+=p
ar%(Voice%,18)
 8240 ENDWHILE
 8250 PLOT 1,(par%(Voice%,16)-
S%+par%(Voice%,18))*4,0
 8260 PROCpeg
 8270 ENDPROC
 8280 :
 8290 DEF PROCfrequency(Col%)
 8300 GCOL0,Col%:MOVE 0,360+pa
r%(Voice%,19)
 8310 PROCpeg
 8320 PLOT 1,par%(Voice%,21)*4
,par%(Voice%,20)-par%(Voice%,1
9)
 8330 PROCpeg
 8340 S%=par%(Voice%,21)+par%(
Voice%,24)
 8350 sus=(par%(Voice%,20)-par
%(Voice%,22))/(par%(Voice%,16)
-par%(Voice%,21))*2
 8360 WHILE S%<par%(Voice%,16)
 8370 PLOT 1,par%(Voice%,24)*4
```



```
,-sus*par%(Voice%,24)-par%(Voi
ce%,23)
 8380 S%+=par%(Voice%,24)
 8390 IF S%<par%(Voice%,16) PL
OT 1,par%(Voice%,24)*4,par%(Vo
ice%,23):S%+=par%(Voice%,24)
 8400 ENDWHILE
 8410 PLOT 1,(par%(Voice%,16)-
S%+par%(Voice%,24))*4,0
 8420 PROCpeg
 8430 ENDPROC
 8440 :
 8450 DEF PROCpeg
 8460 IF Col% GCOL0,6 ELSE GCO
L0,0
 8470 PLOT 0,0,16:PLOT 1,0,-32
:PLOT 1,2,0:PLOT 1,0,32:PLOT 1
,-2,0:PLOT 0,0,-16
 8480 GCOL0,Col%
 8490 ENDPROC
 8500 :
 8510 DEF PROCprompt
 8520 RESTORE+0
 8530 PROCdata_print(7)
 8540 ENDPROC
 8550 DATA 7,1
 8560 DATA 44,0,F1 - F12  For
Voices,45,1,Escape For Options
 8570 :
 8580 DEF PROCname(Text$,RETUR
N Old$)
 8590 LOCAL x%,Input$
 8600 x%=17+LEN Text$
 8610 ON
 8620 REPEAT
 8630 PRINT'"Enter name of " T
ext$ " > " Old$;
 8640 INPUT TAB(x%,VPOS) "" In
put$
 8650 UNTIL LEN Input$<11
 8660 IF Input$>"" Old$=Input$
 8670 ENDPROC
 8680 :
 8690 DEF PROCdata_print(Col%)
 8700 REPEAT
 8710 READ C%,J%
 8720 COLOUR C%
 8730 FOR I%=0 TO J%
 8740 READ X%,Y%,a$
 8750 PRINT TAB(X%,Y%)a$;
 8760 NEXT
 8770 UNTIL C%=Col%
 8780 ENDPROC
 8790 :
 8800 DEF PROCwait
 8810 LOCAL t%
 8820 t%=TIME
 8830 REPEAT UNTIL TIME-t%>10
 8840 ENDPROC
 8850 :
 8860 DEF PROChour(p%)
 8870 IF p%=FALSE SYS "Hourgla
ss_Smash" ELSE IF p%=TRUE SYS
"Hourglass_On" ELSE SYS "Hourg
lass_Percentage",p%
 8880 ENDPROC
```

➤

Get it right ✓

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 9621 1
  50 = DEBB E
  60 = 126A F
  70 = F018 5
  80 = 3C86 F
  90 = 3B4A A
 100 = 9621 F
 110 = 2F83 9
 120 = 600D 3
 130 = DEFB 3
 140 = FD2E A
 150 = 9719 9
 160 = 9719 F
 170 = 72B4 3
 180 = FC31 2
 190 = 4E00 2
 200 = C608 F
 210 = 7410 4
 220 = F4C9 3
 230 = 1210 1
 240 = E3EB E
 250 = E17B 5
 260 = 8DA0 9
 270 =  6CA 9
 280 =  7D3 9
 290 = 8041 B
 300 = 396C 9
 310 = 3550 B
 320 = FD2E 5
 330 = 9719 6
 340 = 40D7 7
 350 = C88C F
 360 = BFBA 1
 370 = 1193 6
 380 = 17B2 F
 390 = 3BDC D
 400 = A704 E
 410 = E473 A
 420 = 42A9 3
 430 = 725C 6
 440 =  8F2 0
 450 = 6647 8
 460 = B04A 3
 470 = D0C2 D
 480 = 2C47 3
 490 = D7F2 9
 500 = 61B3 3
 510 = 40C2 A
 520 = 6028 9
 530 = CF11 C
 540 = B263 4
 550 = 2C83 2
 560 = 2C83 2
 570 = 80D4 F
 580 = 63E9 D
 590 = 8001 0
 600 = E6F4 5
 610 = ED0F 3
 620 = 9719 C
 630 = 98A5 4
 640 = A018 8
 650 =  EF9 4
 660 = 1472 B
 670 = A418 6
 680 = C75E A
 690 = E106 E
 700 = 7F2F 4
 710 = 4676 B
 720 = 4676 0
 730 = 6ED9 0
 740 = D1A1 1
 750 = F7AD 5
 760 = E737 4
 770 = E737 0
 780 = 6ACD 4
 790 = 8738 F
 800 = 94A2 1
 810 = 9338 5
 820 = 8738 3
 830 = 85F1 D
 840 = AED4 F
 850 = 6FDC 1
 860 = AED4 4
 870 = B5B1 B
 880 = AED4 C
 890 = AEB0 C
 900 = AED4 7
 910 = C242 6
 920 = 9632 0
 930 =  DEA 7
 940 = 9632 2
 950 = 33D7 2
 960 = 9632 8
 970 = 8738 C
 980 = 284A D
 990 =  F0D F
1000 = C904 6
1010 = F306 D
1020 = 5080 B
1030 = F63A 5
1040 =  228 0
1050 = 5080 6
1060 = ED3B 4
1070 = 5376 5
1080 = 5080 D
1090 = 8A32 D
1100 = BB5B E
1110 = CDEF C
1120 = 5633 4
1130 = 2087 E
1140 = 71AA E
1150 = 3F09 7
1160 = A52E 1
1170 = C67A E
1180 = D3E1 B
1190 = 8738 9
1200 = 2527 8
1210 = 6130 8
1220 = 9A5A 2
1230 = 9FED A
1240 = 2314 2
1250 = D01C A
1260 = 48D9 1
1270 = 8738 0
1280 = 688E 8
1290 = 6130 7
1300 = 973E 4
1310 = AAC6 C
1320 = AA13 9
1330 = DDE2 1
1340 = 55A0 C
1350 = 23C0 9
1360 =  CE7 5
1370 = 2798 9
1380 = 1243 A
1390 = CD2B F
1400 = 9A8F 9
1410 = 8738 B
1420 = 4EA9 5
1430 = E360 5
1440 = 2BB2 1
1450 = 18D3 9
1460 = BCE0 E
1470 =  F3D A
1480 = 4F6C 7
1490 = B01C 0
1500 = D674 4
1510 = 95D4 7
1520 =  960 9
1530 = 4F6C 4
1540 = B01C E
1550 = D674 4
1560 = 95D4 3
1570 =  960 F
1580 = 4F6C B
1590 = B01C 4
1600 = D674 C
1610 = 95D4 9
1620 =  960 E
1630 = 4F6C 1
1640 = B01C 4
1650 = D674 9
1660 = 95D4 1
1670 =  960 6
1680 = 5151 7
1690 = 5B45 6
1700 = D09B 6
1710 = AFAE 2
1720 = 9EE7 1
1730 = 3A53 D
1740 = E737 F
1750 = 8738 5
1760 = D60E D
1770 = BB5B 0
1780 =  79B F
1790 =  960 C
1800 =  960 F
1810 =  960 5
1820 =  960 C
1830 = 5151 6
1840 = 65EA 4
1850 = AB7A 1
1860 = E737 3
1870 = 8B58 9
1880 = 2C83 9
1890 = 2C83 C
1900 = 9719 1
1910 = A418 5
1920 = 575F A
1930 = 3383 1
1940 = FA8D F
1950 = 636E E
1960 = C8BD D
1970 = 61CD 1
1980 = 9F7A B
1990 =  A15 1
2000 = AA83 F
2010 = 8B58 C
2020 = 2C83 4
2030 = ED0F 3
2040 = 9719 6
2050 = 8CDC 9
2060 = A930 8
2070 = 4467 2
2080 = 9719 9
2090 = 7AD7 F
2100 = A4E9 7
2110 = A018 3
2120 = B687 7
2130 = B4C6 2
2140 = 7629 3
2150 = 6220 7
2160 = EB4B E
2170 = 581C 0
2180 = B49A 5
2190 = 2C83 A
2200 = 8964 6
2210 = AFC3 E
2220 = 33BF C
2230 = 9090 7
2240 = 2C83 2
2250 = 4FB2 C
2260 = 885B A
2270 = 6D93 0
2280 = BBD6 C
2290 = 2C83 8
2300 = 3A46 B
2310 = ED0F 1
2320 = C1C0 2
2330 = 87B0 9
2340 = 595E 1
2350 = 1A8D 6
2360 = 4E78 2
2370 = 4559 5
2380 = 5A71 8
2390 = 3659 6
2400 = AF18 9
2410 =  502 8
2420 = AD5D A
2430 = B4E8 4
2440 = 9719 1
2450 = F361 4
2460 = F077 C
2470 = BFBA E
2480 = 6094 1
2490 = E16F 4
2500 = 49C5 5
2510 = 6386 C
2520 =  8E1 3
2530 = D1C8 9
2540 = 7137 B
2550 = BFBA 9
2560 = F7E0 5
2570 = 5415 A
2580 = 621B 7
2590 = 76C4 6
2600 = 46D5 B
2610 = 92ED 5
2620 = 8796 F
2630 = BFBA 8
2640 = D76B 3
2650 = D539 B
2660 = 5C5C F
2670 = 2C47 1
2680 = 3719 0
2690 = 4A86 F
2700 = 453B F
2710 = 9BA9 3
2720 = AD4E C
2730 = 49C5 2
2740 = 18C0 C
2750 = 4EDD F
2760 =  8E1 F
2770 = 3D5D A
2780 = EA40 0
2790 =  CAC A
2800 = D338 0
2810 = 650B B
2820 = B607 F
2830 = 6827 A
2840 = 10E8 5
2850 = ED0F 1
2860 = 9719 4
2870 = 4097 4
2880 = A018 5
2890 = 2946 3
2900 = 2C83 9
2910 = 885B 5
2920 = 12A5 D
2930 = 2C83 6
2940 = AB6F C
2950 = 8041 E
2960 = 396C A
2970 = 3550 A
2980 = 2C47 A
2990 = 1CE0 C
3000 = FF3E 4
3010 = ED0F A
3020 = 9719 5
3030 = B607 7
3040 = 2ACC 2
3050 = 8A8D 1
3060 = 70E9 B
3070 = 7E9C A
3080 = 2316 E
3090 = 3063 8
3100 = 18C0 8
3110 = 53F1 F
3120 = 50A5 9
3130 =  8E1 0
3140 = 4B58 3
3150 = 2C83 A
3160 = 2316 6
3170 = 3063 E
3180 = 5CDA B
3190 = DEAA 5
3200 = 3B89 C
3210 = 2C83 4
3220 = 53F1 3
3230 = C2DE 8
3240 = ED0F F
3250 = 26BE 5
3260 = 9719 5
3270 = 9E63 5
3280 = 6A2F F
3290 = 10C8 0
3300 = A9BA E
3310 = E3A0 4
3320 = 8A8D E
3330 = 52E5 2
3340 = 31AE 1
3350 = BFBA B
3360 = 5C5C 2
3370 = C401 9
3380 = B79C 0
3390 = FB85 A
3400 = F0D0 1
3410 = C009 9
3420 = F9C7 5
3430 = B944 E
3440 = DA0F E
3450 = 5FA8 6
3460 = 28DC 5
3470 = 55D7 C
3480 = 826D 0
3490 = 19AA 3
3500 = 3382 0
3510 = 44F6 5
3520 = 3B47 B
3530 = 2D75 1
3540 = 6B30 7
3550 = 7F4D 8
3560 = A1FD 9
3570 = 546A 7
3580 = C12C E
3590 = 5129 1
3600 = 39D2 F
3610 = DD9E 4
3620 = 75FD C
3630 = 5A31 D
3640 = 3D03 0
3650 = FD71 3
3660 = DD8E 9
3670 = 6822 8
3680 = EADB 8
3690 = 6A97 2
3700 = 8345 9
3710 = 590B 2
3720 =  65F 7
3730 = 7552 0
3740 = D6D3 5
3750 = 2DFE A
3760 = C9CF F
3770 = C9A4 4
3780 = 6A7F E
3790 = 53A6 F
3800 = 9D50 E
3810 = 2C43 E
3820 = AF9A F
3830 = FECB 8
3840 = ED0F 3
3850 = 728B 1
3860 = 1760 5
3870 = 1CEB 2
3880 = 16C6 C
3890 = 5F2E 0
3900 = AE4B F
3910 = 6955 D
3920 = 1081 A
3930 = 9719 4
3940 = C824 A
3950 = D9C2 D
3960 = E3A0 A
3970 = BFBA 5
3980 = 82DA 3
3990 = C063 1
4000 = 498C 5
4010 = 74B8 4
4020 = EB5E 4
4030 = 6C49 F
4040 = 25E3 3
4050 = 3ADD C
4060 = 3CF6 A
4070 = F02B 6
4080 =  239 0
4090 = 6827 7
4100 = 18C0 3
4110 = BBEC F
4120 =  8E1 8
4130 =  261 D
4140 =  DA0 B
4150 = FA17 6
4160 = 2C2C 9
4170 = ED0F 4
4180 = 9719 F
4190 = 503A 8
4200 = 5FEE 7
4210 = 96C5 7
4220 = EA7A 2
4230 = 8E0D A
4240 = F6F6 3
4250 = 7558 8
4260 = C608 A
4270 = 18C0 8
4280 = 6CB9 2
4290 = AC67 7
4300 = 2C83 6
4310 = AF6E E
4320 = 5C17 7
4330 = 2989 0
4340 = C608 E
4350 = 18C0 D
4360 = EB4B 8
4370 = 60B8 D
4380 = 2C83 A
4390 =  4A5 B
4400 =  8BA B
4410 = DB34 1
4420 = 2F83 C
4430 =  8E1 A
4440 = 8910 A
4450 =  8E1 3
4460 = ED0F 5
4470 = 9719 C
4480 =  EB7 5
4490 = 5FEE B
4500 = 96C5 8
4510 = FEFC 9
4520 = E0FB 0
4530 = AAD3 9
4540 = 39A3 4
4550 = EB4B C
4560 = 2DFE B
4570 = 2C83 B
4580 = 8910 9
4590 = DB34 1
4600 = 2F83 7
4610 =  8E1 3
4620 = ED0F 0
4630 = 9719 8
4640 = 3B44 8
4650 = 6600 1
4660 = 40F5 B
4670 = A08C D
4680 = E35D 6
4690 = 2F83 7
4700 = ED0F 4
4710 = 9719 1
4720 = 6654 A
4730 = 3EB5 7
4740 = A018 7
4750 =   D6 A
4760 = 2C83 9
4770 = A418 3
4780 = 8B01 5
4790 = 3383 1
4800 = AED4 9
4810 =  72F 4
4820 = 5C6F 3
4830 = AED4 A
4840 = 8DE6 9
4850 = A025 9
4860 = AED4 B
4870 = 8738 6
4880 = F5B6 9
4890 = BD5F D
4900 = 1C74 C
4910 = 24FA 0
4920 = 8738 1
4930 = 6C08 D
4940 = D862 E
4950 = 1C74 7
4960 = 24FA E
4970 = 8738 0
4980 = 6624 1
4990 = 419F B
5000 = 24FA 0
5010 = 8738 F
5020 = 6234 3
5030 = ED3D B
5040 = 46AF 4
5050 =  6A5 6
5060 = 8B58 8
5070 = A018 1
5080 = EE38 F
5090 = E106 A
5100 = A071 9
5110 = CDEF 3
5120 = 31E3 6
5130 = 1F4C 2
5140 =  2EA F
5150 = 8B58 1
5160 =  8E1 5
5170 = 2C83 E
5180 = E106 3
5190 = CA96 1
5200 = 8738 D
5210 = 2463 3
5220 = ED3D 5
5230 = 7DC4 D
5240 = 626D 9
5250 = AB49 A
5260 = 62B2 D
5270 =  E84 3
5280 = 6659 3
5290 = B2C5 2
5300 = CA96 9
5310 = 8B7E B
5320 = 8B58 4
5330 = 2C83 A
5340 = 4012 5
5350 =    B 3
5360 = E0FB 3
5370 = 6227 9
5380 = F08D 2
5390 = 2C83 9
5400 = A018 9
5410 = EE38 2
5420 = 7CF4 C
5430 = 2AB4 D
5440 = 2C83 A
5450 =  8E1 F
5460 = 2C83 3
5470 = F4CA D
5480 = F577 9
5490 = ED0F F
5500 = 9719 3
5510 = 5E16 7
5520 = AAC3 2
5530 = 1CE0 9
5540 = BFBA C
5550 = 9185 9
5560 = DFC9 9
5570 =  ABE 4
5580 = B258 5
5590 = 94D3 D
5600 = ED0F 1
5610 = 9719 B
5620 =  2FC 9
5630 = 5A22 7
5640 = 334C 0
5650 = B837 E
5660 = F2AB 7
5670 = 21DC E
5680 = 966E 4
5690 = F59B 8
5700 = AD35 E
5710 = F1BA 1
5720 = 6A74 A
5730 = 538A 3
5740 = 2C83 D
5750 = 6520 8
5760 = D5D8 A
5770 = 61B3 8
5780 = 1A3C E
5790 = 2C83 3
5800 = 5D8C E
5810 = 999C D
5820 = 7BEF 9
5830 = 8A8D 7
5840 = 61D4 F
5850 = 53F1 D
5860 =  D4F 1
5870 = FD73 9
5880 = 10C8 6
5890 = A98A A
5900 = ED0F D
5910 = F383 F
5920 = AB07 6
5930 = 1C34 C
5940 = 308D 9
5950 = 88A3 6
5960 = D9FF B
5970 = 545E 6
5980 =  3F7 7
5990 = 9719 1
6000 = C259 1
6010 = A1E3 3
6020 = ED0F C
6030 = 9719 6
6040 = F2CE 8
6050 = E84F E
6060 = 277C 5
6070 = 616D A
6080 = 885B 7
6090 = BBD6 0
6100 = 2C83 A
6110 = 2F83 D
6120 =  8E1 F
6130 =  8E1 B
6140 = ED0F 1
6150 = 9719 A
6160 = D486 0
6170 = 307B 6
6180 = FA61 F
6190 = 18C0 1
6200 = DD13 B
6210 = 33F6 A
6220 =  8E1 A
6230 =  8E1 7
6240 = F205 A
6250 = BFBA A
6260 = F3F3 5
6270 = ED0F 0
6280 = 9719 8
6290 = 51A2 5
6300 = 265B E
6310 = F859 C
6320 = 698F 8
6330 = 3314 B
6340 = 18C0 C
6350 = 8299 7
6360 = 4E6D 9
6370 = E3F3 A
6380 = 18C0 9
6390 = 88BC 6
6400 =  C81 5
6410 =  8E1 0
6420 =  8E1 4
6430 = 18C0 2
6440 = FAAE A
6450 = 1FE1 F
6460 =  8E1 1
6470 =  8E1 C
6480 =  8E1 5
6490 = ED0F 5
6500 = 9719 F
6510 = 517E 4
6520 = FCB7 0
6530 = 2EBB 4
6540 = 1951 0
6550 = 8057 4
6560 = 5C5C 1
6570 = 6520 B
6580 = 453B 3
6590 = 9719 4
6600 = DCE6 A
6610 = 53F1 5
6620 = 748E 5
6630 = F114 5
6640 = 18C0 E
6650 = C227 B
6660 =  8E1 3
6670 = 6221 0
6680 = 4B77 0
6690 = ED0F E
6700 = 9719 E
6710 = 4F7C 1
6720 = C41B C
6730 =    B 1
6740 = 32B3 8
6750 = 7EDA B
6760 =  EEB 1
6770 = C5A2 1
6780 = 7539 5
6790 = 999C B
6800 = 5D8C 0
6810 = ED0F C
6820 = 9719 8
6830 =  7B9 4
6840 = C41B 0
6850 = CB45 9
6860 = 8CC0 4
6870 = A7FF C
6880 = 18C0 7
6890 = FD7D D
6900 =  8E1 C
6910 = 18C0 C
6920 = 8CC0 0
6930 = F6A7 8
6940 = 18C0 F
6950 = 9A4B 3
6960 =  8E1 C
6970 =  8E1 6
6980 = 5D8C D
6990 = 4B77 3
7000 = 453B 1
7010 = 9719 0
7020 = 9B35 0
7030 = 2ADF F
7040 = 4E8E C
7050 =    B C
7060 = EF81 C
7070 = A46C 1
7080 = 999C E
7090 = ED0F 0
7100 = 9719 9
7110 = 3C8A 3
7120 =    B 4
7130 = CB45 8
7140 = 2CF0 7
7150 = 3D11 B
7160 = 18C0 1
7170 = 58E8 B
7180 =  8E1 6
7190 = 18C0 A
7200 = 2CF0 4
7210 = BDAF D
7220 = 18C0 1
7230 = 1AB3 6
7240 =  8E1 0
7250 =  8E1 E
7260 = 999C 7
7270 = 4B77 5
7280 = 453B C
7290 = 9719 8
7300 = 4DDF D
7310 = B2B4 C
7320 = EB57 D
7330 = 833F 0
7340 = BEF4 2
7350 = 5558 F
7360 = 18C0 9
7370 =  CE6 A
7380 =  8E1 2
7390 = 6527 3
7400 = ED0F A
7410 = 9719 6
7420 = 94A4 7
7430 = 9A37 9
7440 = 3084 1
7450 = 6540 8
7460 = F1B3 E
7470 = 2C83 9
7480 = 6A75 A
7490 = 38B9 C
7500 = A2B0 F
7510 = 2C83 9
7520 = ED0F D
7530 = 9719 2
7540 = 98BB B
7550 = EE09 F
7560 = 636C 0
7570 = F55E 4
7580 = E5E3 0
7590 = C43D F
7600 = FA41 E
7610 = A80B C
7620 = ABE0 B
7630 = D98F 1
7640 = D75F E
7650 = 9EAA 4
7660 = D75F 3
7670 = 3882 1
7680 = 7E6A 9
7690 = 9D7E 4
7700 =  4F3 9
7710 = BC93 F
7720 = AA96 8
7730 =  8BD F
7740 = A80B 8
7750 = D3A8 9
7760 = C5B2 1
7770 = 3D8B 0
7780 = 3882 6
7790 = EB54 0
7800 = EE64 E
7810 = 18C0 9
7820 = 6610 C
7830 = 16A1 2
7840 = 9895 F
7850 = 3882 A
7860 =  8E1 8
7870 = ED0F A
7880 = 9719 5
7890 = 8BC6 A
7900 = F708 3
7910 = F9AE 6
7920 = 1104 B
7930 = 9895 C
7940 = 2C83 5
7950 = ED0F 0
7960 = 9719 F
7970 = 4E00 F
7980 = F708 3
7990 = FFAF 3
8000 = 9895 8
8010 = 2C83 3
8020 = ED0F E
8030 = 9719 F
8040 =  DC9 C
8050 = 4A8D 2
8060 = AD35 1
8070 = ED3D F
8080 = 2C83 9
8090 = ED0F F
8100 = 9719 E
8110 = 1E39 6
8120 = DA9D 1
8130 = 42B3 1
8140 = B49E 6
8150 = 42B3 8
8160 = C43D B
8170 = FA41 3
8180 = A80B 1
8190 = A8E5 0
8200 = D98F A
8210 = 20B9 7
8220 = 1821 D
8230 = 20B9 D
8240 = 3882 8
8250 = 8A95 B
8260 = 42B3 6
8270 = ED0F 2
8280 = 9719 A
8290 = E77D A
8300 = 2E24 2
8310 = 42B3 8
8320 = 7632 D
8330 = 42B3 7
8340 = AA96 9
8350 =  8BD 2
8360 = A80B 0
8370 = 418A 0
8380 = C5B2 3
8390 = 5A75 7
8400 = 3882 E
8410 = 108B 6
8420 = 42B3 C
8430 = ED0F 5
8440 = 9719 4
8450 = A0F0 D
8460 = 87C5 9
8470 = B39B 1
8480 = 6D4F 3
8490 = ED0F 6
8500 = 9719 7
8510 = A760 1
8520 = 8A8D 1
8530 = 52E5 D
8540 = ED0F E
8550 = AE4B F
8560 = 4B12 2
8570 = 9719 6
8580 = 167A E
8590 = F42A B
8600 = 879A D
8610 = 1CE0 6
8620 = BFBA 1
8630 = 8BEF 0
8640 = 49A7 1
8650 = 54FF 0
8660 = CEC1 7
8670 = ED0F C
8680 = 9719 A
8690 = 303F D
8700 = BFBA 0
8710 = D3C4 7
8720 = 2BCC E
8730 = 788A B
8740 = 489D 8
8750 = EB95 9
8760 = 2C83 1
8770 = 175B D
8780 = ED0F 6
8790 = 9719 9
8800 = D51B 1
8810 = DADD 6
8820 =  5E3 D
8830 = 2D79 4
8840 = ED0F 0
8850 = 9719 F
8860 = 8B15 4
8870 = 5CDE E
8880 = ED0F 4
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PINEAPPLE SOFTWARE

The Pineapple Software Real Time Colour Video Digitiser

What is a Real Time Video Digitiser? There are quite a few different 'Digitisers' available for the Archimedes but very few can accurately claim to fit the above description. The requirements are that it must be able to 'grab' a single field of video information from a colour moving source, such as a video recorder, TV, or video camera, and then process the image and display it on the computer screen.

The Pineapple Digitiser does just this, – and at a price which is less than some Digitisers which can only handle static images.

HARDWARE

The hardware consists of a double width podule which fits inside a 300 or 400 series Archimedes, and comprises a PAL colour decoder, 256K memory and various control and interface circuitry. The PAL decoder converts the input signal from your TV or video recorder into separate red, green and blue signals. These are then converted into digital form and stored in the 256K ram in a format giving 512 pixels across the picture and 256 rows vertically. The video signal in the ram is constantly changing at the same rate as the incoming video picture until the podule receives a signal from the computer to 'freeze'. At this point the last picture in the ram is frozen and can be transfered to the computer screen in many different ways depending on which software commands are issued.

SOFTWARE

The software to drive the podule is supplied on disc in the form of a relocatable module. This provides a host of additional '✱' commands and SWI's which can be used even by inexperienced programmers to produce very impressive displays of live pictures or ones previously saved on disc. For non-programmers, ready written programs are provided to explore all the features of the Digitiser and produce 'Sprite' images which can be used in many other applications and 'Art' packages. The software is very easy to use and scaling routines are provided which allow you to manipulate the grabbed image by selecting any part of the picture (using a box drawn on screen controlled by the mouse) and placing it on any area of the screen, again using a box to select the position and size. This enables multi-picture images to be produced very rapidly using either live pictures or ones you have previously saved on disc. The 80 page handbook provides full details of how to implement the commands even for the inexperienced programmer.

EDUCATION

The Digitiser has many uses in education. The software commands can show many of the effects typical of the digital storage of TV pictures which can help to explain the way in which TV works. It can also be used to produce powerful audio-visual displays tailored to your own requirements from images captured using video cameras etc. For younger children, programs can be created to help learning by giving high quality visual images of animals, birds, trees etc, built into a 'quiz' format. The possibilities here are endless.

FUN & GAMES

As well as showing off to all your friends who don't have an Archimedes, what a great computer it is, you can use the Digitiser to produce images for all sorts of games and visual demonstrations. Games such as 'Guess the Celebrity' or 'Guess the Advert' can be produced by even inexperienced programmers, simply by 'grabbing' all the necessary images from TV and saving to disc.

SPECIFICATION

Video Inputs	Pal coded video, .75 Volts – 2·5 Volts pk to pk R, G, B & sync input All inputs may be terminated by internal DIP switches.
Resolution	512 x 256 pixels
Storage system	Standard version 4 bits Red, 4 bits Green, 4 bits Blue – 192KRam Extended version 5 bits Red, 6 bits Green, 5 bits Blue – 256K Ram
Picture Area	The Digitiser harware allows the full screen area normally viewed to be stored in the podule ram. Horizontal shift, Vertical shift and width can be adjusted internally if required.
PAL Decoder	The PAL decoder provides manual control of Brightness, Contrast and Saturation, combined with full auto saturation control.

QUESTIONS & ANSWERS

Q – What is the difference between the 12 bit and 16 bit version?

A – The 12 bit version can produce very high quality pictures, those shown on this page were produced that way, but 16 bits can give even better results particularly in high resolution screen modes.

Q – Why have an R, G, B input?

A – For those who have professional video cameras capable of producing R, G, B outputs, the R, G, B inputs can give significantly better results than the PAL inputs by avoiding the coding-decoding process. This removes some of the defects of the PAL system such as cross-colour, and also reduces noise.

Q – Is a moving picture available?

A – Yes, you can show a real live moving TV picture on the computer screen. This means that if you are using a video camera or recorder as an input source then you don't need a separate monitor to frame up the picture.

Q –Will it work on the A3000?

A – Yes, but you need an inexpensive adapter box which we can now supply.

Q –Are the controls difficult to set up?

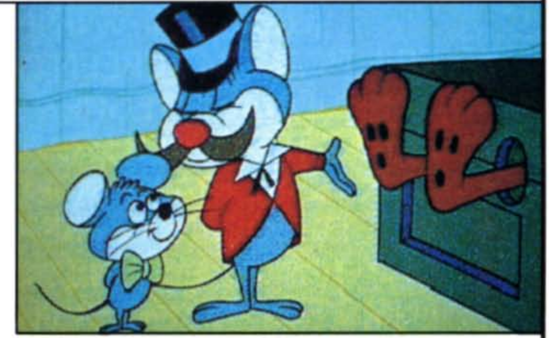
A –No, the three controls are exactly the same as on a normal TV set, Brightness, Contrast and Colour (Saturation). They may appear difficult to get at as they are at the back of the computer, but once set to your preference the brightness and colour should not require further adjustment, and the contrast (which is the easiest to get at) will only need adjusting if the video input source is changed.

Q –Does it take a long time to Digitise a full screen colour image?

A –Not really, a full screen image takes just 6 seconds on a standard 310, and reduced size images take proportionately shorter times.

Q –What software commands are built into the module?

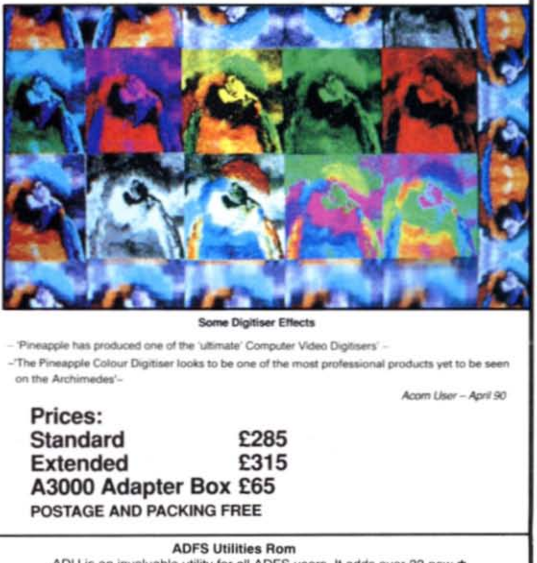
A –The software is under continual development and updates will be made available under our usual updating schemes (i.e) most updates are free), but the currently available commands are :– Average, Bits, Default, Digitise, Flip, Focus, Freeze, Image, Loadscreen, Loadsprite, Loadvideo, Mono, Moving, Negative, Noise, Outline, Palette, Primary, Restorescreen, SaveAIM, Savescreen, Savesprite, Savevideo, Screenarea, Setvideo, Unfreeze, Videoarea.



Cartoon

THE PYRAMID GAME
BBC1
THE PEUGEOT 405

A Multi Picture Image



Some Digitiser Effects

– 'Pineapple has produced one of the 'ultimate' Computer Video Digitisers' –

–'The Pineapple Colour Digitiser looks to be one of the most professional products yet to be seen on the Archimedes'–

Acorn User – April 90

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Standard	**£285**
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This ever popular Rom based PCB designer is suitable for all BBC micros. It's fast high density 1:1 scale print routine allows prototype boards to be made directly from a printout, and a 2:1 scale print may also be used to produce professional quality boards. A second Eprom is optionally available to add a powerful auto-track routing facility to the program. This utilises a 'rats-nest' input routine and allows any component to be 'picked up' and moved around the board without having to re-specify component interconnection.

The full auto-route facilities are available even on a standard unexpanded model 'B'.

'PCB Autoroute is remarkable. No similar software comes near the price.'

ACORN USER Aug 88

PRICE	Manual track routing	£85.00
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ADFS Utilities Rom

ADU is an invaluable utility for all ADFS users. It adds over 22 new ✱ commands to the ADFS filing system as well as providing an extensive menu facility with over 35 sub commands covering such areas as repearted disc compaction, saving and loading Rom images, auto booting of files, and many more. Transferring of files from DFS to ADFS is also made very easy.

ADU ....£29.00 P&P free

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Access

Lateral thoughts on super coding

£10 Prize letter

THE usefulness of the program Protect in the December 1989 issue of The Micro User *depends upon the encoded file penetrability level. This is determined substantially by the length of the single Ascii byte sequence repeatedly applied along the length of the file and should be as long as is consistent with the ability to input it reliably each time.*

For a single coding this length is equal to the length of the input coding string, and long strings are notoriously unreliable due to Case, Punctuation and so on.

With multiple encoding the equivalent (unlimited) length is equal to the lowest common multiple – LCM – of the lengths of the separate input strings.

For example, the maiden names of my paternal grandmother are SOPHIA, OPHELIA and OBENEY and are a potentially useful double or triple-encoding set:

*SOPHIA then OBENEY has the same LCM as both SOPHIA or OBENEY at value six. Vastly superior is OPHELIA then OBENEY, which has an LCM of 7*6 – this is no different to triple input.*

Evidently the best method is multiple encoding using names with lengths incompatible in factor terms, because this leads to the biggest LCM value.

It is essential to think laterally to find name sequences which are both easily remembered (usually some personal reference) and unlikely to be associated because of distance in either space or time.

It's also wise to hold several back-up encoded copies unless you are one of those rare people who never make a mistake.

A useful trick is to hold down Control while entering alphabetic characters only. This not only calls up Ascii numbers less than 32 but also shows nothing on the screen – see page 378 of the User Guide.

To take this matter further we must, regrettably, be more technical: Ascii tables – pages 490-491 in the User Guide – show the following:

Numbers greater than 127 (&7F) have their most significant bit (MSB) set to one and no equivalent character unless working in Teletext Mode 7.

Numbers less than 128 (&80) have an MSB of zero and can be subdivided into four groups identified by their left-most three bits only and we can conveniently define them as the LBT0, LBT1, LBT2 and LBT3 groups.

The table below shows the group identities resulting from EORing members of two groups and should be interpreted as meaning ONE member of LTB1 EORed with A member of LTB3 giving SOME member of LTB2. *The 4 by 4 table is adequate to handle any thinking about Ascii-byte EORing.*

EOR	ltb0	lbt1	ltb2	ltb3
ltb0	ltb0	ltb1	ltb2	ltb3
ltb1	ltb1	ltb0	ltb3	ltb2
ltb2	ltb2	ltb3	ltb0	ltb1
ltb3	ltb3	ltb2	ltb1	lbt0

When cut down to a 2 by 2 table it tells us what happens to EORing two MSBs – a byte greater than 127 EORed with a byte less than 128 gives a byte greater than 127.

Fortunately MSB=1 bytes are not too common in files, but they can assist decoding because they stick out like a sore thumb.

The most common ones are &FF giving a string length and a string following and &B0 to &B9 obtained by the Shift key combined with the red keys. It is for this reason that a long multiple-input code is strongly recommended.

When a long code is used, it can be comprised entirely of ltb0 bytes – using Control+alphabetic – because ltb0 EORed ltb0 gives ltb0 no matter how many times it is done.

The table shows that the group identity is unchanged by EORing with any ltb0. This discourages manual decoding via a hexadecimal printout because it looks easy due to the patterns – frustration rapidly intervenes.

In any case the additional problem of getting from the long ltb0 sequence back to the original names causes further difficulty unless the LCM has very few factors. – **R. H. W. Annenberg, Aylesbury, Bucks.**

Simulator body blow

I HAVE an Acorn Electron and I recently bought the game Pro-Boxing Simulator, a new release from Code Masters.

When I loaded the program I found out that it was identical to By Fair Means or Foul by Superior Software. Please could you explain this coincidence. – **David Milliken, Renfrew, Scotland.**

● We made some inquiries and it seems that Code Masters now has the rights to sell this game on its own, while Superior is permitted to sell it on compilation.

Win a tenner

WANT to write to The Micro User? The addess is: Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield, SK10 4NP.

Writers of the most interesting letters receive a £10 prize.

Checking out a micro mate

COMPUTERS are brilliant at playing chess and world championships are often held to decide which program is better than the rest. This frustrates me, as I am unable to beat any computer chess program.

What I want to know is what happens when a program plays itself. Is the outcome always a draw, or does the computer which made the first move always win? If so, could you tell me this winning first move and hopefully my computer wil resign there and then. – **P. D. Welsby, Edinburgh.**

● When two programs of similar ability or, even the same program running on different machines, are pitted against each other the outcome is never predictable.

A program has a set of opening gambits which it follows religiously until either their opponent fails to follow the sequence or it reaches the end of the sequence itself.

However the choice of gambit will be selected at random – as will the response. In addition once the program is out of

➤

➤

the gambit sequence its decisions are based on the minimax theory.

The idea is to maximise the advantages of your position while minimising your opponent's. The program does this by analysing board positions and choosing one which gives it the best advantage.

However, sometimes it may find two moves that give it the same advantage. At this point it has two choices: It can choose one at random or analyse these particular moves further.

The number of moves ahead that a program analyses is called the *depth* – a program that could analyse every single possible board position from the start to the end of a potential game might give up after your first move – but how does it know what moves you'll make?

How well a program works depends on two things: How many moves ahead it looks and how good it is at figuring out the advantages of relative board positions. Obviously two different programs use alternate methods of calculating, so they will behave differently.

But, and this is true of all computer programs, if you know everything about the programs and how they behave and they don't contain any random elements it is *theoretically* possible to figure out what each move will be.

The trouble is that Chess is so complex – and the programs are so intricately designed – that there is no right first move.

Configuring smaller discs

ANYONE using an external 5.25in disc with the PC Emulator on the Archimedes may find that they can't read 360k PC discs, as the software expects them to be 720k.

You can alter the CONFIG.SYS file on the MSdos boot disc either with EDLIN – which is not very friendly – or the simpler, though equally unfriendly, COPY+CON. From the Dos prompt type:

```
A>COPY CONFIG.SYS+CON (Return)
  (Return)
  DEVICE=DRIVER.SYS /D:2 /T:40
/S:2 /F:0 (Return)
```

Now press f6 and Return to save the data.

Reset the system with Control+Alt+Delete and you will see that logical drive D: is now recognised by the system – it's still the external drive, but this time set up to be 360k.

So to format a 360k disc, for example, just type FORMAT D:.

The great thing about this is that you get the best of both worlds with just the one, physical, drive, C: is 760k and D: is 360k.

For the technically minded the format of DRIVER.SYS is as follows:

```
/D:ddd /T:ttt /S:ss /H:hh /F:f
```

where ddd *is the physical drive number (1 to 999),* ttt *is the number of tracks (1 to 999) 40 gives 360k and 80 gives 720k,* ss *is the number of sectors per track (1 to 99),* hh *is the number of heads with a default of 2, and* f *is the device type, 0 is 360k and 2 is 720k.* – **Kevin Robinson, Morpeth, Northumberland.**

Tricky data for brill Brickie

THANK you very much for the excellent game Dickie Brickie from the March 1990 issue. The graphics were just superb, better than some of the rubbish I've forked out good money for in the past – and although the object is fairly simple, the game very addictive.

As with all such wonderful games, there is the typing in beforehand – plenty of it, too – and all that sprite data must have been a pain for somebody – but that's not my problem, because I get the subscription disc.

I can follow most Basic programs but this one had me baffled at first – that sprite data? What sort of commands were all that lot? And what about this?

```
220 START
```

I came to the conclusion that these lines were never actually executed, or even examined by Basic. I think the program just accesses the memory directly where they are stored for their information. Is this correct?

Also, why the incessant plugging of the L.E.A.s? Neither the author's name or initials are Lea (or L.E.A.), so why?

- *Level one – in the split second when the buildings are being built, the letters L.E.A. flash across the bottom.*
- *On level two, the second line on the optician's chart comprises these immortal letters.*
- *They return on level three to fill the entire screen.*

One last thing – I've found a tiny, tiny bug in it. I was on level 11 – yes, I was quite chuffed as well – when my last life was suddenly cut short by a rampant pair of scissors – prophetic?

However, for some strange reason I re-materialised with lives at 0 and promptly died again. With lives then on -1, I continued to play up to level 15 and then back to 1 and up to 4 again. With a final score of 2,054,500 and lives at -32, I decided that it was never going to end, so I pressed Break.

I suspect that if a line somewhere in the middle reads something like:

```
xxx IF lives =0 THEN PROC-
GameOver
```

If this was changed to:

```
xxx IF lives<=0 THEN PROC-
GameOver
```

then on future occurrence the game would end immediately. **– Tim Morley, Bolton, Lancs.**

- Your assumptions about the sprite data for Dickie Brickie – and Car Race in this issue – are correct, the data is accessed directly and never executed.

What happens is that *FNstart* is called and this searches for the word START finally returning the memory address of the line after it. Note that it is vital that the line is typed in as:

```
220START
```

with no spaces before or after the word. Remember we always produce our listings using LISTO1 and WIDTH40, which means that if you type them in in Mode 7 using AUTO what you get on the screen will match exactly what's in the magazine.

The asterisk at the start of every line is there to make

Valuable source of memory

I AM responding to the letter from Ron Maitland in the June issue of The Micro User *regarding the 12k Sideways Ram on the BBC B+. Before upgrading to a BBC A3000 at the beginning of the year I was the proud owner of a BBC B+ and must point out that the 12k is part of a full 32k which is mainly used for shadow screen.*

In order to be able to load rom images larger than 12k in length Mr Maitland should consider buying the 64k upgrade for the B+, as supplied by Acorn. This is a small ram board that sits at a tangent to and on the right-hand side of the printed circuit board.

This 64k is made up of four banks of 16k ram for the following uses:

Each bank can have a rom image loaded and will then be treated as a rom. Contrary to what most dealers advise, a write protect switch can be added, I had one fitted with the minimum of fuss.

The 64k can be used for Basic programming using Basic128 – details are supplied with the upgrade. It can also be configured for use as a printer buffer (16, 32, 48, 64k) ram disc or a mixture of the two using such software as Beebug's Master-Rom – which I can recommend, having used it for over a year.

It is also possible to save areas of ram from PAGE to &7FFF to the sideways ram temporarily while you load, edit and run other programs. Details once again, are supplied.

I hope this information helps Mr Maitland. I found the upgrade (you are supplied with a sticker quoting 128k) to be invaluable. – **M. Whiteman, Lewisham.**

sure Basic ignores the line when you type it in – it thinks each of these lines is an operating system command.

The data read routine extracts the data in groups of three. The first character specifies the number of bytes – calculated by ASC"x"-32 – while the second two are the hex value of the byte. So the code:

```
!FF"00980
```

means set one byte of value &FF, followed by two bytes of &00 and ASC"9"-32 = 25 bytes of &80.

Registers for cursor effects

IN the March issue Dr. I. R. Shand asked how he could stop the cursor flashing, but keep it on the screen. I have discovered some CRTC commands which alter the cursor. The first one does what Dr. Shand asked for, the others might be useful:

```
VDU 23,0,10,12,0,0,0,0,0,0
VDU 23,0,10,1,0,0,0,0,0,
VDU 23,0,10,22,0,0,0,0,0,0
VDU 23,0,10,72,0,0,0,0,0,0
VDU 23,0,10,82,0,0,0,0,0,0
VDU 23,0,10,112,0,0,0,0,0,0,
```

These commands all alter the 6845 CRTC circuitry. They occur in the form:

```
VDU 23,0,B,A,0,0,0,0,0,0
```

This puts the value A into register B. You are warned not to try this sort of thing unless you know how to program the 6845.

Also, in the April issue you gave a routine to crash the system and erase memory on any sort of Break. If you use:

```
*FX200,3
```

it will do the same . It definitely works on the BBC B, Master, and Master Compact. – **D. Croft (age 11), Reigate, Surrey.**

● There are two registers you can use to alter the cursor: Register 10 specifies the cursor start line and register 11 sets the cursor end line.

By using these you can change the thickness and position of the cursor – even have a thin line moving up and down instead of flashing.

The only problem lies in the fact that the values are different for Mode 7.

Underline routine for LaBelle

THE label creating program LaBelle in the November 1989 issue of The Micro User *suggested adding a routine to switch underline on and off. So here it is:*

Use Control+f0 to place a code which switches underline on and Control+f1 for off. The routine can be altered easily to recognise other codes and respond accordingly. The original program requires some slight modifications to allow for the new routine. Add the lines:

```
30 PROCa
2015 IF I%=144 OR I%=145 GOTO
2050
```

Then include the listing for PROCa.

Line 0 is a further idea in the lazy save theme that you've had recently.

I use this at the beginning of all my programs. On the Master it puts TIME$ after the first REM in the program. There must be at least 26 letters after it – make sure there is one in the first line.

All you have to do is put the name of your program in the inverted commas and type:

```
SA.FNS
```

If you're not using a Master, all you need is:

```
10DEFFNS="name"
```

I think this is the simplest and most effective method.

```
   0 DEFFNS:FORL%=PAGETO&
FF+PAGE:IF?L%=244FORIL%=L
+2TO25+L%:?iL%=ASCMID$(TI
ME$,IL%-L%+1):NEXT:="LaBe
lle"ELSENEXT:REM>Mon, 30
 Oct 1989.11:38:32<
5010 DEFPROCa
5020 FORL=0TO2:P%=&B00
5030 [OPTL:SEI:LDA&22A:ST
Ao+1:LDA&22B:STAo+2:LDA#y
 MOD256:STA&22A:LDA#y DIV
256:STA&22B:CLI:RTS
5040 .y:CPX#3:BEQ p
5050 .o:JMP&1111
5060 .p
5070 \DETECT AREA
5080 CMP#144:BEQunderline
5090 CMP#145:BEQstop unde
rline
5100 \END
5110 JMP n
5120 \WORK AREA
5130 .stop-underline:LDA#
27:JSRn:LDA#0:JMPn
5140 .underline:LDA#27:JS
Rn:LDA#45:JSRn:LDA#1:JMPn
5150 \SEND
5160 .n:JSRo:PHP:CLI:NOP:
NOP:PLP:BCSn:RTS
5170]:NEXT:CALL &B00:ENDP
ROC
```

– **C. J. Richardson, Hedon, Hull.**

Italics from a jet printer

I HAVE owned an Acorn JP101 ink jet printer for many years but owing to lack of an instruction manual I haven't been able to access either the italic or bit-mapped modes. Even the manufacturers, Olivetti, haven't got a manual. Can you help? – Eric Keeley, Ramsgate, Kent.

● We don't have one either. Can any reader help?

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested. On the rare occasions when mistakes occur corrections are published as a matter of urgency.

Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we cannot answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the letters pages.

Splitting decimals

IN regard to Dealing with decimals from the Letters pages of the May issue, there's a simple solution to Mr. Ellis' problem. To round a number N to 2 decimal places just use:

```
N = INT(N*100+0.5)/100
```

The problem with Mr Ellis' method is that the micro will often display a number such a 14.475 as 14.47499999. This does not seem to cause a problem with the arithmetic method above.

To produce columns of numbers with different formats we can use @% as often as necessary. Try:

```
 10 MODE3
 20 FOR I=1 TO 20
 30 Z=RND(10000)/1000
 40 X=INT(Z*100+0.5)/100
 50 Y=INT(Z*10 + 0.5)/10
 60 @%=&20207:PRINTTAB(5)
X;
 70 @%=&20106:PRINTTAB(15)
Y;
 80 @%=10:PRINTTAB(25)Z
 90 NEXT
 100 END
```

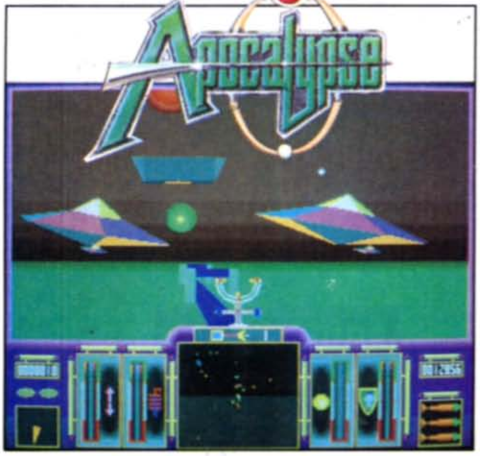
The semi-colons at the end of lines 60 and 70 keep the printing on the same line.

The display will be three columns of numbers, each right justified.

In the last column you will probably see several examples of numbers such as 16.4999999 or 15.45000001, slight errors caused by the conversion of decimal to binary and back again. – **J. Jones, Kirk Michael, Isle of Man.**

A3000
ARCHIMEDES
BBC B/MASTER
ELECTRON

THE 4TH



APOCALYPSE

Apocalypse is designed purely for the Archimedes. Utilising the machine's colossal processing power combined with ingenious programming techniques, the author has created a masterpiece which could not have been produced on any other home computer. The author is of course Gordon Key who already has Holed Out and E-Type under his belt. Apocalypse is by far his best work to date.

The game places you on the surfaces of varied futuristic hostile planets colonised by ruthless enemies. With your highly advanced craft you must find your way around the planets and systematically annihilate the enemy. Your ship, which can fly or move along the ground, is extremely fast and can even fight whilst hurtling backwards.

The graphics are truly unbelievable. The solid, shaded 3 dimensional buildings and objects are animated more quickly and smoothly than ever before. If you shoot at them they explode in a way that is terrifyingly real often catching fire before bursting into a ball of flames accompanied by devastating sound effects.

Initially Apocalypse is easy enough for a beginner to enjoy but as you progress your foes will become increasingly hostile and you will discover fascinating new objects. These can have strange properties and many may need to be destroyed. It will be up to you to discover how.

The Royal Guild of Spacing will monitor your progress as you play. Your performance will be assessed at appropriate times and you will need to impress them if you are to continue your adventure. Apocalypse is an amazing game. There's only one way to describe it....

RAW EXCITEMENT.

PRICE: A3000/Archimedes £29.95

A3000/ARCHIMEDES

A3000/ARCHIMEDES

A3000/ARCHIMEDES

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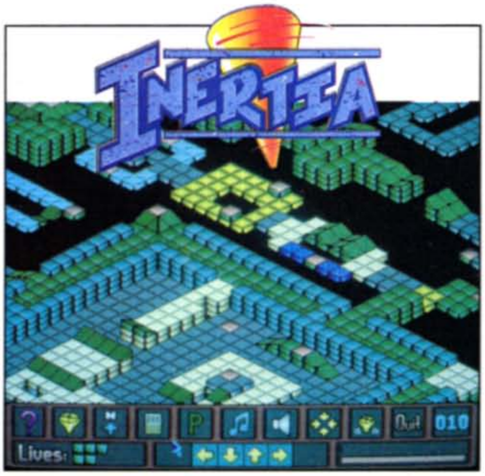

INERTIA

Inertia is a totally original game with a huge landscape just waiting to be explored. It is available for the Archimedes, BBC Micro and Acorn Electron. Scattered (or rather fiendishly placed) around the landscape are many special tiles which need to be collected. Your highly sensitive craft floats freely around the landscape and you must exert forces upon it to guide its speed and direction.

You have a 3 dimensional viewpoint displaying a tiny fraction of the total playing area. There are walls, bridges, tunnels and ramps to negotiate and a host of mystery tiles with strange properties indeed. These include ice, jump and transformation tiles. There are even certain tiles which alternate the controls so that everything works in reverse.

This massive game has been very carefully put together and solving the puzzles within it will need lateral thought and a lot of dexterity.

The Archimedes version is considerably enhanced with digitised sound and music. It even features a full colour 3 dimensional map of the game which is a joy just to wander around. You'll certainly be amazed at the size of the game and the variety within it.

Inertia is a game for the determined. Each version makes full use of the ability of the computer so make sure you've got plenty of time to spare. Once you have started you won't be able to stop.

Electron User Golden Game May'90

BBC Micro and Acorn Electron versions available ***NOW****.*
Enhanced Archimedes version available in June, 1990.

PRICE:		
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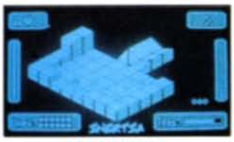
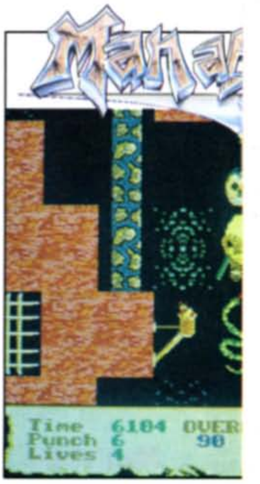

ELECTRON

A3000/ARCHIMEDES

A3000/ARCHIMEDES



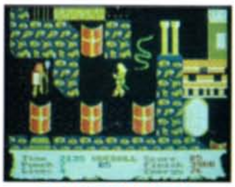
MAN-AT

In the age when the castle was supreme it took dedicated warriors to overcome their defences, to loot and pillage, and finally to destroy.

You are armed with a mighty sword cast from the remains of a thunderbolt which fell from the sky many millennia ago. Also in your possession is a magic potion which makes you invincable to all for short periods of time. Armed with these you must penetrate the inner recesses of 4 castles and do battle with all you find in them.

As you progress you will discover many intriguing objects which can behave very strangely. Many are documented such as wooden panels, hour glasses, thorns, portculli, mirrors etc.. But most are

PRICE: A3000/Ar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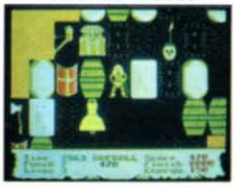
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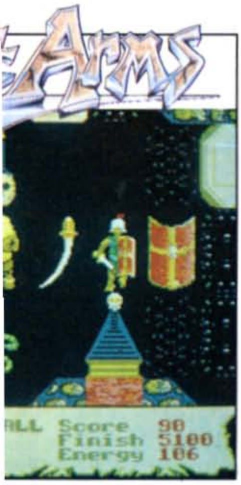

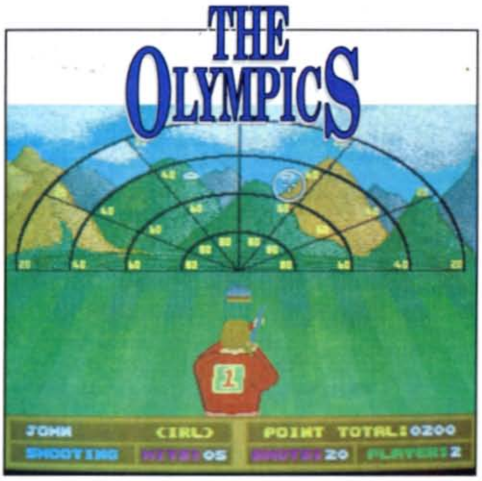

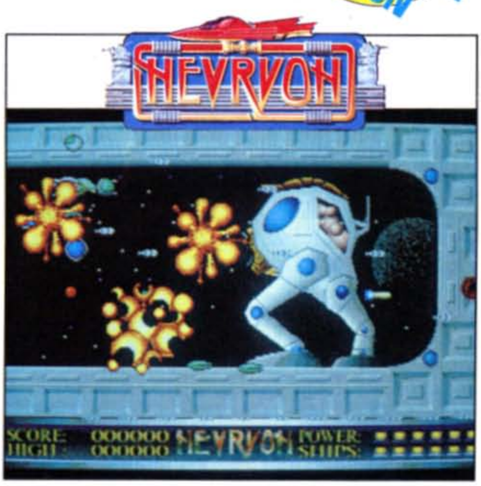

-ARMS

not. When you think your stuck, experiment and you'll discover properties you never knew existed.

The subtle blend of arcade timing and adventurous puzzles make Man-At-Arms fiendishly addictive. You must plunder each of the 4 castles which become increasingly "puzzling" as you progress. Your overall objective is to kill all foes with your mighty sword and to plunder as much of the most valuable treasure as you can carry.

Man-At-Arms is a fascinating challenge with superb sound effects and music. No attention to detail has been spared and you can be sure of many late nights for weeks to come.

himedes £19.95

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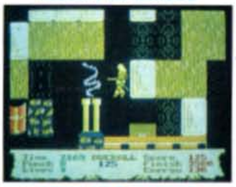


A3000/ARCHIMEDES

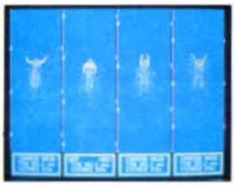
THE OLYMPICS

The Olympics is an experience which can be played by 1 to 8 players. It contains a superb piece of music, opening and closing ceremonies and 14 national anthems. When a player wins a gold medal the national anthem for his chosen country is played. Any World Records that you achieve can be saved to disc. With the click of a button all the relevant information concerning the record is automatically saved including your name, the exact time, day and date!

It is comprised of 6 main events: Diving, Shooting, Javelin, Swimming, Canoeing and Pole Vault. Some of these have several "sub-events" to choose from - there are 2 Shooting events, 12 Swimming events and 3 Canoeing events. These events have been chosen for maximum variety and enjoyment. They will "extract" all sorts of abilities: manual dexterity, timing, memory, perserverance, adaptability and above all guts!

The menu systems are controlled entirely with the mouse. As such they are extremely easy and quick to use. All events can be practiced or competed in individually, or altogether for maximum Gold, Silver and Bronze medals. You can also play all 6 events as a sort of "hex-athlon" where points are awarded for each event - the player with the greatest number of points is deemed to be the winner.

PRICE: A3000/Archimedes £19.95



A3000/ARCHIMEDES

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WORLD RECORDS

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NEVRYON

This fast arcade game is disc based only and boasts 100K of graphics and game code for the BBC and 2 discs of over 1.5 megabytes for the Archimedes. It is a fast sideways scrolling shoot'em up which features 8 levels of furious opponents and very varied and very detailed graphics.

You fly a spaceship which can attain immense firepower - more lasers, a ram, gun droids and highly destructive missiles which are released from the top & bottom of your ship, then ignite and shoot forwards.

Whilst the BBC version is superb, the Archimedes version has been considerably enhanced and is truly exceptional putting many arcade games to shame. Nevryon uses the machine's raw power to full effect and gameplay is second to none.

It comes on 2 discs and features 5 true levels of parallax scrolling, more than 50 objects on screen, over 1 megabyte of 256 colour graphics, digitised stereo sound and music etc. etc.. You control a different ship on each of the 4 scenarios and there are a seemingly infinite number of weapons to collect and use. End of level monsters are beautifully animated but are anything but friendly.

BBC Review: "Graphics are very colourful and hectic, with explosions, missiles and aliens all heading for your ship. Together with a scrolling landscape, complete with stars moving in the background, they combine to form an enjoyable and action packed game." Micronet, Feb'90.

BBC Micro version available ***NOW.***
Enhanced Archimedes version available in June, 1990.

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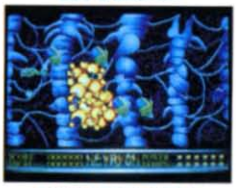
BBC B/MASTER

BBC B/MASTER

A3000/ARCHIMEDES



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Mike Bibby
Getting started in BBC Basic on the BBC Micro & Electron
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Database Publications' DTP

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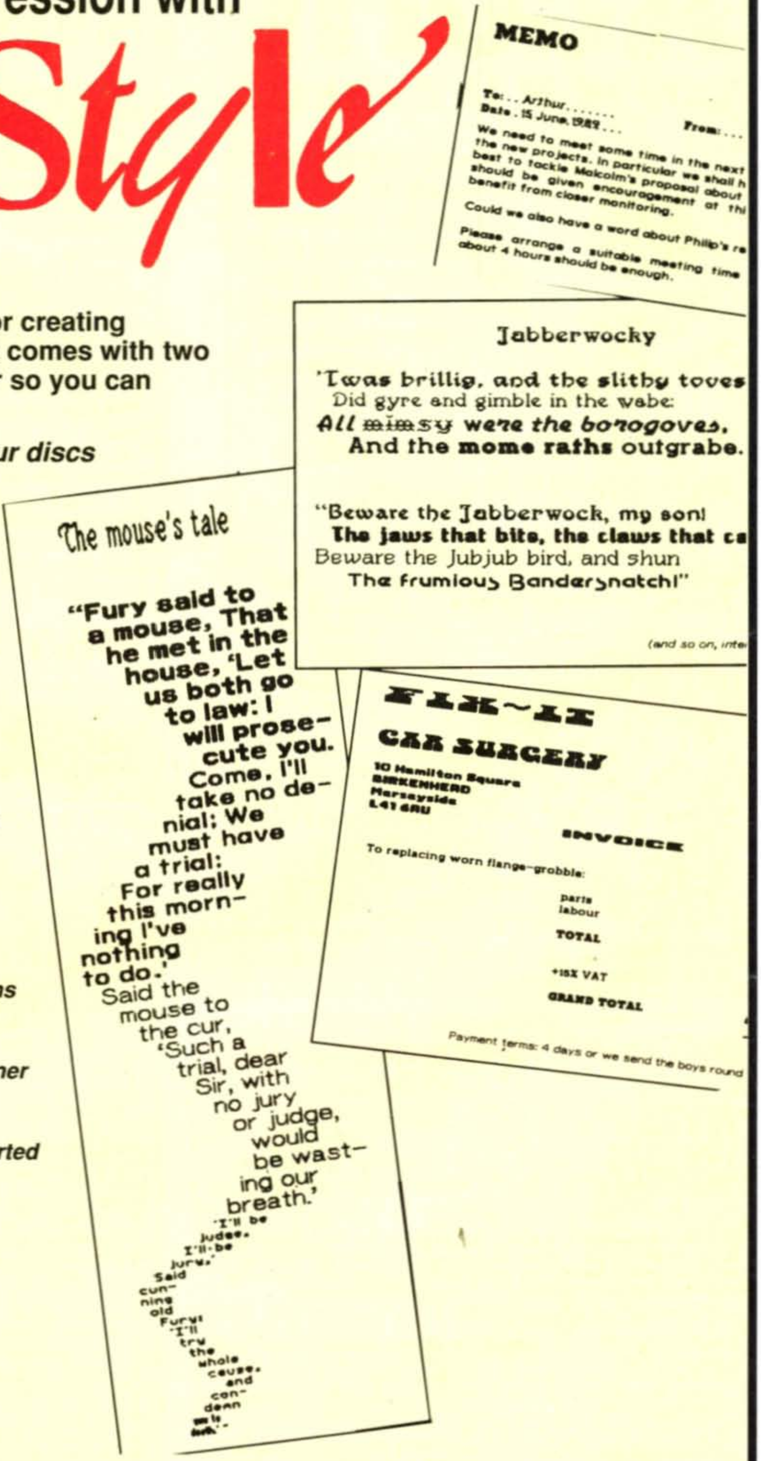

MEMO

To: .. Arthur........
Date . 15 June, 1989 ...
From: ...

We need to meet some time in the next
the new projects. In particular we shall h
best to tackle Malcolm's proposal about
should be given encouragement at thi
benefit from closer monitoring.

Could we also have a word about Philip's re

Please arrange a suitable meeting time
about 4 hours should be enough.

Jabberwocky

'Twas brillig, and the slithy toves
Did gyre and gimble in the wabe:
All mimsy were the borogoves,
And the mome raths outgrabe.

"Beware the Jabberwock, my son!
The jaws that bite, the claws that ca
Beware the Jubjub bird, and shun
The frumious Bandersnatch!"

(and so on, inte

The mouse's tale

"Fury said to
a mouse, That
he met in the
house, 'Let
us both go
to law: I
will prose-
cute you.
Come, I'll
take no de-
nial; We
must have
a trial:
For really
this morn-
ing I've
nothing
to do.'
Said the
mouse to
the cur,
'Such a
trial, dear
Sir, with
no jury
or judge,
would
be wast-
ing our
breath.'
'I'll be
judge,
I'll be
jury,'
Said
cun-
ning
old
Fury:
'I'll
try
the
whole
cause,
and
con-
demn
[illegible]
[illegible]'-

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(see page 116)

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(see page 117)

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(see page 117)

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(see page 116)

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(see page 124/125)

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(see page 124/125)

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(see page 66)

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(see page 124/125)

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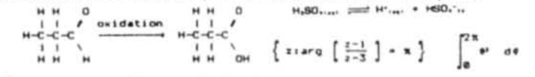

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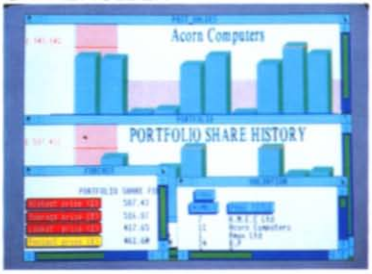

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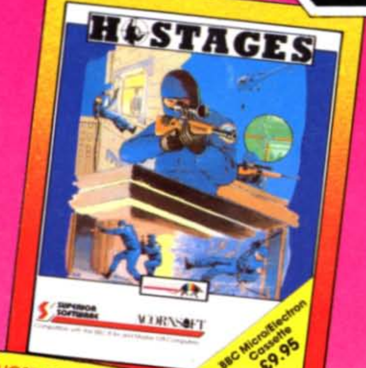
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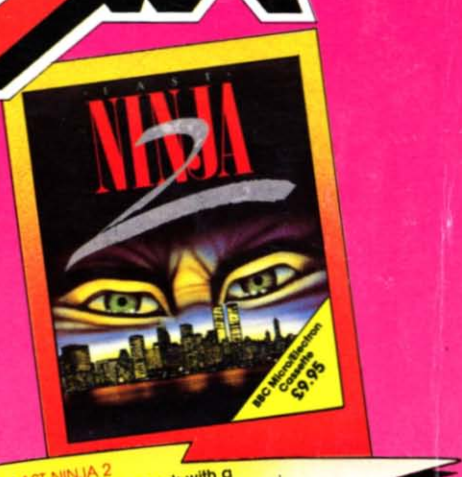
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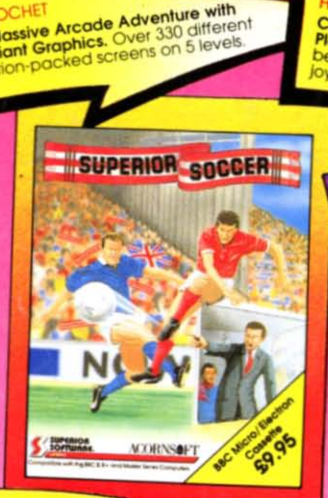
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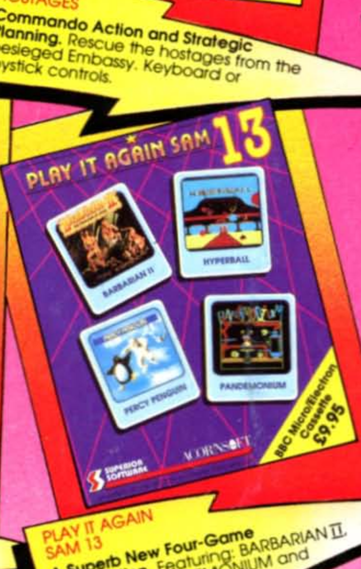
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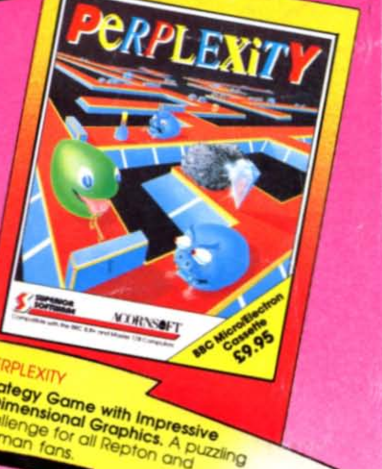
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